

COAL AGE

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The Loan—A Great Opportunity

THE Liberty Loan offers to the coal operator an opportunity to transform his employees from men without a definite aim into men with a well-defined purpose in life. Some men have never saved anything except what they have spent in sundry furnishings for their homes, which furnishings are already sadly mauled and disfigured by frequent shiftings from village to village.

The chance is good to sell them something that will stand by them in the future, something that will make them feel that they have a recognized place in the order of things. We do not really become a part of the country till we have contributed to its support, whether as tax payers or as bond buyers, for "where our treasure is there will our heart be also."

The Liberty Loan furnishes the opportunity for starting America on a road of thrift, a chance to remodel our old shiftless habits and give us a steadiness, a determination and a purpose which too many of our workingmen have hitherto not had.

Drift will give place to thrift. It is time that some such change should take place, and the coal operator will fail to do his duty to the country and himself if he neglects to take advantage of it.

The recognition of a public duty, the exhibit of public spirit on the part of a citizen raises him out of the narrow rut of his individualism. If to spend money on a flag makes a man a better citizen, lending and spending money to defend that flag will make him a super-citizen.

There is too much disposition to say that large sales of bonds cannot be made. They can be sold



"MA, THAT'S THE COMPANY WE'RE STOCKHOLDERS IN"

if we have the necessary enthusiasm and faith and put the right energy in our canvass. Properly appealed to, there are few workingmen at mines that work with reasonable steadiness who will not buy bonds and pay for them in short order.

The need of our country appeals forcibly to every man, woman and child. Let every operator get the men together, and if he can't make a convincing speech himself, after a few words of introduction, let him call on some politician or some church orator. Let him post the timely bulletins that he will find in *Coal Age*, both in the editorial and advertising departments of the paper. Let him supplement these by

the telling cartoons in the daily newspapers and such bulletins as are being distributed by the various Government departments and the National Safety Council.

But the appeal by word of mouth is worth all the others. The coal operator should lead in this Liberty Loan movement and indeed in all good movements. He should identify himself with every good work. He should put himself always in the position of leader among his men.

Our social work is too much restricted to mere talk as to the appropriate relation of the employee to the employer, to the stupidity of class antagonism and to the value of co-operation. All such disquisitions are true but unconvincing.

What we need is a positive programme, a national purpose, an actual co-operation, an act of faith and service in which we are all equally engaged, and there will be less need then to discuss just exactly where we all stand in relation to one another.

IDEAS AND SUGGESTIONS

Frog, Switch and Track Formulas

BY O. H. HAMPSCH
Washington, D. C.

In the figures and tables below I have given several simple and fundamental principles of track laying as applied to mine work. Too often little or no care is taken in laying track in important places in mines, whereas if the foremen were familiar with a few track rules and tables more regular turnouts could be made.

A poorly laid switch or frog is a weak point in a track and the cause of many derailments and accidents. These cost time, output and money. They might be avoided if a little pains were taken in laying switches.

In most cases I have found the trouble with switches to be that the curvature and angle of frog do not correspond with each other as they should (a No. 4 frog, say, having a No. 6 lead) or that the stiffness or flatness of the curve is out of proportion to the frog angle. It must be remembered that in manufacture the switch points and frogs are made straight and not curved with the lead rail as many suppose. In Fig. 1 only the distance bc or bc_1 is curved to connect switch points and frog, the position of the frog to vary with the angle and lead.

Fig. 3 shows the terms most commonly used in handbooks and track tables. Simple rules for measuring frog members are as follows: Measure the spread h on the toe of the frog and add to it the spread h_1 on the

the frog. Example: If $h = 6$ in., $h_1 = 9$ in. and $bc = 60$ in., the frog number equals $\frac{60}{6+9} = 4$.

Another rule for ascertaining the frog number is to find the point f on the frog where the spread equals 1 ft., and from this point measure the distance to the theoretical point or the intersection of the gage lines. This point is in front of the actual or $\frac{1}{2}$ -in. point, the distance being one-half of the frog number in inches—that is, a No. 6 frog distance from the actual to the theoretical point equals 3 in., a No. 5 frog $2\frac{1}{2}$ in., etc.

The observance of a few of the fundamental rules regarding frog, switch and track laying, and the exercise of more care in laying tracks by trackmen will do much to diminish the many derailments and accidents caused in mine work. These have heretofore too often been disregarded.

You buy LIBERTY BONDS because you believe with every American in backing this war to the last dollar, the last soldier, the last ounce of energy.

Counting Revolutions Without a Counter

BY W. F. SCHAPHORST
New York City

A speed counter is not an absolute necessity for determining the speed of a turbine, motor, spindle, shaft or other rapidly rotating machine part. Speed can be counted "by hand" to a surprisingly high limit by using the fingers in connection with the nimble mind.

For instance, you can count up to 10 very quickly—much more quickly than you can from 10 to 20. This is because it takes more time to allow the longer names to pass through your mind, such as 13, 14, 15, etc. They are all two-syllable words, whereas one, two, three, four, etc., are mainly one-syllable words. The logical way to count rapidly, therefore, is to count up to 10 over and over and keep tab on the number of times counted to 10 on your fingers. It will surprise you how easy it is to count in that way. To count 400 or 500 r.p.m. in that manner is no trick at all. If one should try counting "straight," however, he will find it too cumbersome to say "twenty-one," "thirty-seven," etc., even mentally, and the job will have to be abandoned.

I stumbled upon this method of counting mentally quite by accident one day while testing a gasoline engine. I permitted the key in the main shaft to strike my finger at every revolution and mechanically tried to count. I found that I could get up to 10 easily, but not far beyond, and as a result I thought of this repetition method of counting.

Just let some projecting piece from the shaft, pulley, or whatever it may be, strike a finger of one hand as it rotates, and with the fingers of the other hand keep tab on the number of tens. It is not necessary to count

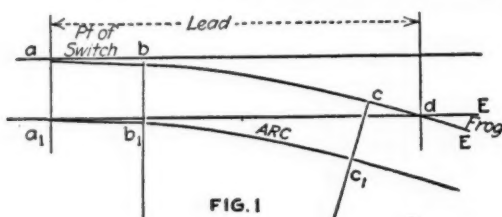


FIG. 1

ORDINATES FOR 30' RAILS

DEG OF CURVE	ORD b AND b1	M ORD a
5	$1\frac{1}{8}$ "	$1\frac{1}{8}$ "
10	$1\frac{3}{8}$ "	$2\frac{3}{8}$ "
15	$2\frac{1}{8}$ "	$3\frac{1}{8}$ "
20	$3\frac{1}{8}$ "	$4\frac{1}{8}$ "
25	$4\frac{1}{8}$ "	$5\frac{1}{8}$ "
30	$5\frac{1}{8}$ "	$7\frac{1}{8}$ "

FIG. 2

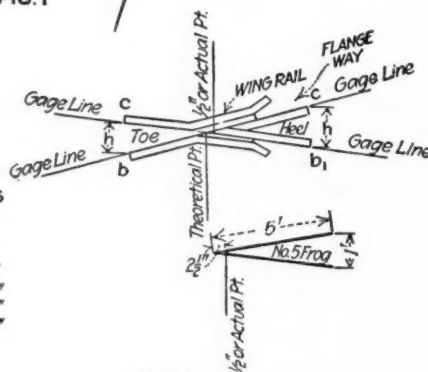


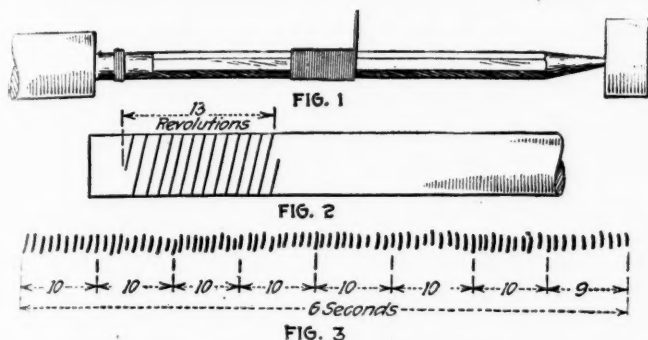
FIG. 3

FIGS. 1, 2 AND 3. ILLUSTRATING SWITCH DATA

heel of the frog, taking care that the measurements are made to the running or gage line of the rail. Next measure the length of the frog bc or bc_1 of the same unit—that is, in inches or feet and decimals thereof. Divide the spread $h + h_1$ into the distance bc (or bc_1) and the number corresponding will give the number of

a full minute, of course. If you count for 15 seconds, multiply the result by four and the product is the revolutions per minute. If you count for 10 seconds, multiply the result by six and the product, again, is the revolutions per minute.

Another simple way is to attach a long thread to a lead pencil (Fig. 1). The pencil should have a rubber



FIGS. 1, 2 AND 3. VARIOUS METHODS OF COUNTING REVOLUTIONS

eraser at one end. Hold the eraser end against the end of the shaft in the same way that the regular speed counter is used, pressing against the point of the pencil with a piece of hard wood or metal to provide a pivot bearing, and the thread will wind upon the pencil as it spins around.

At the end of a half minute, or five seconds, or any convenient interval, remove the pencil and count the number of turns of thread upon it. It is then a simple matter to compute the revolutions per minute. If you have had the pencil winding the thread for six seconds, multiply the number of turns by 10 and the result is the revolutions per minute.

If conditions are such that the machine or shaft can be stopped temporarily, a simple way to count the revolutions is to run a lead pencil lengthwise of the shaft for a period of five, ten, or more seconds, making a mark on the shaft during that period (Fig. 2). The mark made, of course, will take the form of a spiral, and all that is necessary is to count the number of turns made during the test period and then compute the revolutions per minute, which is done as already explained.

This method is valueless if the shaft cannot be stopped. One point worthy of remembering, however, is that the mark will remain on a shaft for some time. At the end of the day's run, therefore, it would be possible to count the revolutions per minute made during any period of the day. If the shaft is a long one it can be made to register the speed during any hour or every hour.

Another effective and simple method is to file a nick in the end of the shaft and run a piece of cardboard or paper along against the edge with the result seen in Fig. 3. A series of marks will be made on the paper as indicated in the sketch, and by timing the operation and counting the number of marks it is a simple matter again, just as above, to determine the speed of the shaft. Even if the speed is 3000 r.p.m. or more it makes no difference with this method.

For example, this record shows 79 marks made on the paper in six seconds. It will be noticed that I have divided the record into groups of 10 marks to

facilitate counting and in order to guard against error. "Divide the number of seconds into 60 and multiply by the number of marks" is the rule that applies to this and cases explained in the foregoing.

$$60 \div 6 = 10$$

$$79 \times 10 = 790$$

Therefore the shaft makes 790 r.p.m.

It is now clear that a special speed counter is not an absolute necessity. There are many ways in which problems can be overcome that appear difficult at first blush. A speed counter is handy, to be sure, and one should be owned if it is necessary to determine speeds often. But for special cases any one of the above hand-made counters will do quite well indeed.

You buy LIBERTY BONDS because the man behind the gun is doing his bit and you want to do yours. He cannot fight long without your help.

Coal Mining in Relation to Engineering

BY L. H. FRIEND, M. E.

Denver, Colo.

Many coal mines develop, become producers and get along for some time without the assistance of an engineer other than to comply with the law which requires a map of the mine to be made every six months, showing the area of coal extracted. This is possible where an expert looked over the ground before operations were started and had an accurate survey made to show the topography of the ground at the probable site of the plant.

Anyone laying out a plant would also often advise prospecting by drill and otherwise to determine conditions under which the coal seam existed. Drill holes should give the thickness and quality of the coal, the nature of the top and bottom rock and the elevation of the seam at different points. If the drill holes have been put down systematically and in sufficient number, then the strike and dip of the coal seam can be determined.

The consulting engineer, being provided with complete information, determines the best underground development, harmonizing it and the surface improvements to secure the best results in the mining, preparation and shipment of the coal. It is important that a system of mining be planned which will give not only a satisfactory daily tonnage but also recover a large percentage of the coal—give a plant which will at the same time be a source of pride and profit to the owner.

In the operation of the mine, an engineer can to advantage set sights in rooms and entries, thereby securing uniform development and tend to prevent a squeeze and other difficulties. Levels run on haulage roads give a profile which discloses at once where hollows should be filled in and high points be cut down. A more uniform grade permits of cheaper haulage and increased tonnage.

If a mine is to show satisfactory results it should have in the management a capable man who will pay strict attention to details of operation—good ventilation and drainage, straight rooms and entries with adequate pillars, good rolling stock and sufficient power to move it, etc.—one who thoroughly understands men and machinery.

New Plant and Mines of the Coal Run Mining Company

BY DEVER C. ASHMEAD

Tarrytown, N. Y.

SYNOPSIS—Article describes a new plant under construction and a standard system of mining to be adopted—a panel system is to be employed which is somewhat different from that ordinarily followed. Trolley and storage-battery locomotives will be installed. Tipples are standard in design.

TWO old mines are being remodeled and four new mines opened by the Coal Run Mining Co., at Coal Run, Penn. These operations at the present time have an output of 1700 tons a day, but when the new developments are completed about 4600 tons of coal a day will be produced. The company owns approximately 4000 acres of coal land and intends to take all the coal out through the six openings mentioned above. Four of these openings are in the upper Freeport seam, the other two being in the lower Freeport. The upper Freeport seam has 4 ft. of clean coal and a slate top and fireclay bottom, while the lower Freeport has 5 ft. 2 in. of clean coal, the top and

bottom being of the same nature as that in the other seam.

Although the upper seam is 72 ft. above the lower, it is possible to open all the mines at tippie height, because the axis of the Jacksonville-Saltsburg anticline passes through this property. The lower Freeport outcrops on one edge of the tract, but soon dips below the surface. Of course, the upper Freeport dips with it, bringing it in a short distance to tippie height. The general dip of the coal is 5 per cent. N 62 deg. W.

The Coal Run Mining Co. is associated with one of the large operating companies in Indiana County and has adopted the methods used by its larger brother. Everything in connection with the operation has been standardized—for instance, the drift opening, the tippie, the mine workings, the substations, the fans, the crossovers, the cars, and the houses. The system of mining has also been standardized, and is followed as closely as the underground conditions will permit.

The walls supporting the drift mouths are built of cut sandstone laid in mortar, making an attractive approach to the openings. The mine is opened on the four-story system, having a right air-course, a main

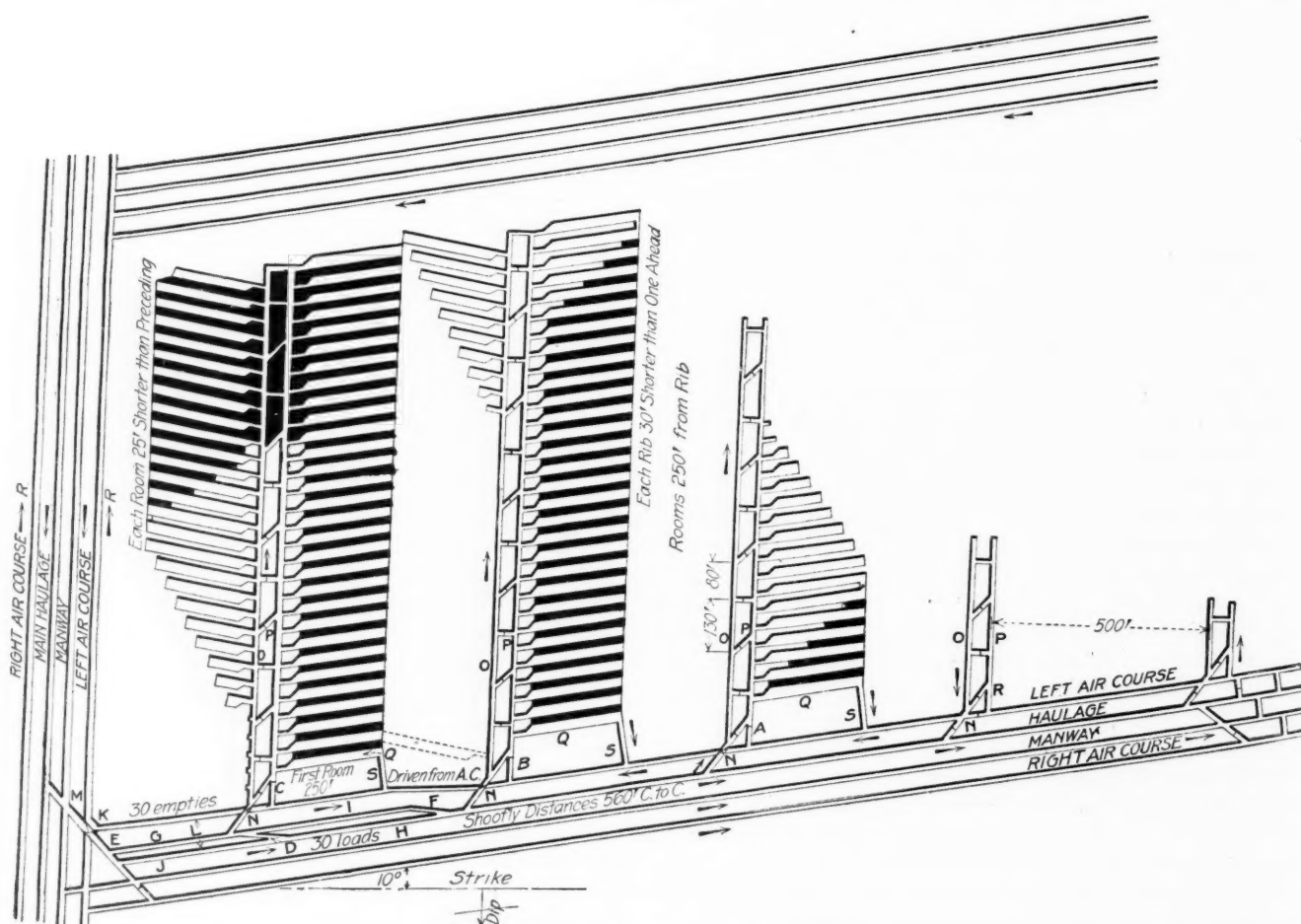


FIG. 1. DETAILS OF THE STANDARDIZED SYSTEM OF MINING OF THE COAL RUN MINING COMPANY

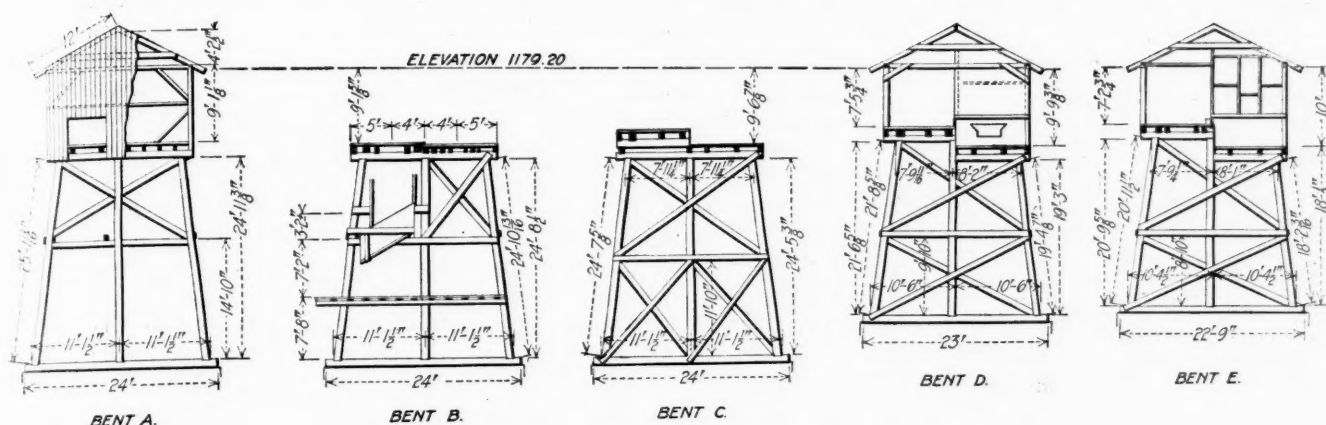


FIG. 2. CONSTRUCTION DETAILS OF THE TIPPLE

haulage road, a manway and a left air-course. The main entries are driven to the greatest dip of the coal and on 50-ft. centers. As each entry is supposed to be 10 ft. wide, a 40-ft. pillar is thus left.

Fig. 1 shows the standardized system in detail. Cross-entries with the same number of headings are driven at an angle of 80 deg. to the main headings. This allows sufficient grade to take care of the drainage. These cross-entries are driven on 1500-ft. centers. The four cross-entries with their pillars take 150 of the 1500 ft., leaving a 1350-ft. pillar to be worked. In case the cross-entries are short the manway and one air-course are omitted.

Butt entries are driven parallel to the main entry up the pitch of the coal. As the rooms are 250 ft. long, and a pillar of 100 ft. is left between the ends of the rooms and the main left air-course, the first butt entry on each cross-entry is driven, starting 350 ft. from the left air-course of the main entry. Then every 560 ft. a new butt entry is turned parallel to the first butt entry. These entries are 1250 ft. long.

As stated above, the rooms are 250 ft. long. They are driven on 40-ft. centers, the room itself being 22 ft. wide and the pillars 18 ft. The rooms are turned off both sides of the butt entries at an angle of 80 deg., giving them a pitch of about 1 per cent. and allowing them to drain.

The panel A, Fig. 1, shows the rooms being driven on the right side of the butt entry as it advances. The rooms are so driven that the face of one is always 25 ft. in advance of the one immediately following. As soon as the rooms reach their proper length, the robbing of the pillar commences. It is planned to pull about five of these pillars at one time, the face of each being kept 30 ft. behind the one immediately preceding. This gives the robbing face a straight line at an angle of about 45 deg. to the face of the rooms. All the pillars are taken out except 40 ft. which is left at the end of the room pillars to support the butt entries.

When the butt entry has been driven to within 100 ft. of the cross-entry above (this is left for a barrier pillar) it is stopped, and the rooms are turned on the left side of the butt entry coming back. When three or four rooms are driven up the robbing of their pillars is commenced, and the same method of keeping each rib 30 ft. shorter than the one ahead is followed. In this case, instead of leaving a heading stump to protect the haulage road this is robbed, as is also the pillar

between the headings and the heading stump on the other heading (see panel C, Fig. 1; the shaded portions show robbing). This method brings the whole butt entry back at the same time.

Near the main entry at the beginning of each cross-entry a sidetrack is provided to handle all the coal for the cross-entry unless this entry should be over eight to ten panels, when another sidetrack would be provided further along.

The left air-course of the cross-entry is started about 30 ft. nearer the outside at K, Fig. 1, than it ordinarily would be if there were no sidetrack. This leaves the pillar L, of about 70 ft., between the airway and the haulage road. This pillar is split by the heading GI for a distance of about 700 ft. where this heading joins

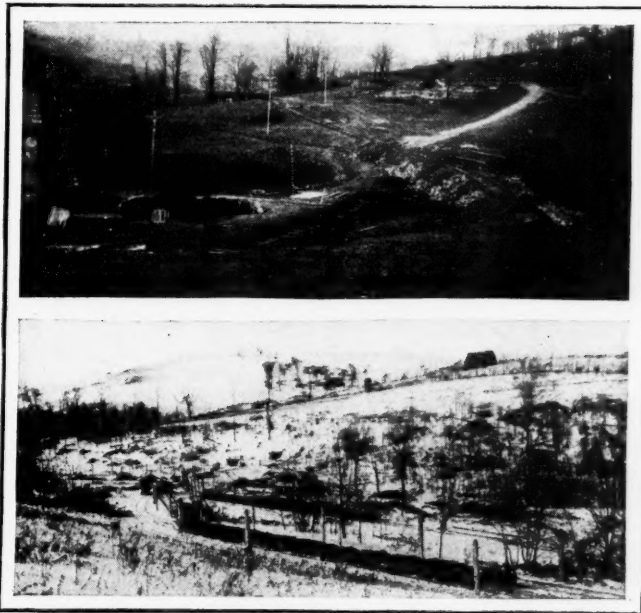


FIG. 3. ARRANGEMENT OF TRACKS FROM NO. 5 MINE

the haulage road, and the left air-course comes back to its normal position. The short heading GI, at its halfway point D, is connected to the haulage road. Track is laid in both the haulage road and the heading GI, and switches are installed at E and F, a cross-over switch being located at D. The heading GI and the haulage road are connected to the main haulage road by the diagonal drift M.

The sidetrack is operated as follows: The main-line

motor comes from the main haulage road through *M* to the empty track *G*. Here it drops 30 empties, uncouples, runs through *D* and couples to the loads waiting at *H*. The loaded cars are taken through *J* to *M*, then to the main haulage road and outside. The first gathering motor leaves its loads on *H*, where 30 cars can be stored, then runs through *D* and back on *I*, and waits until the main-line motor brings the empties. The gathering motor then couples to the empties and runs, through *I* and *F* to the haulage road. The second motor, if there are loads on *H*, makes a flying switch at *F* and then goes through the same performance as the first motor. The haulage roads and the butt entries are connected by the shooflys *N*.

The main haulage road and the manway act as the intake for the air, while the left and right air-courses serve as the return. The air for each panel passes from the haulage road *HJ* through the shoofly *N*, then through the left butt entry *O* into the rooms on that side (if any), then across to the light butt entry *P* and through the rooms (if any) to the first room on the right *Q*, or *R* if the first room has not been finished. If the room has been finished, *R* is bratticed and air passes through *Q* and *S* to the left air-course and then to the outside.

The arrangements for directing the air are such that

the men at the working faces breathe pure air. None of the air that passes through old workings or overfalls goes to the miners. Bricks are used for all stoppings. These are embedded in mortar for the permanent stoppings and are loose for temporary ones. The doors are only temporary and are of wood. The overcasts have brick piers and sidewalls, and the floors are made of steel rail with brick laid endways between the webs. The overcasts have a cross-section 10 x 5 ft. In Fig. 1 the stoppings are shown by double lines, doors by one line and overcasts by a cross.

The ventilation is supplied by two small Stine fans. These are 6 ft. in diameter and are driven by 10-hp., 440-volt, three-phase motors. One of the fans is at the No. 1 mine, the other being at No. 3. These fans will soon be replaced by 150,000-cu.ft. Jeffrey fans. These will be 6 ft. in diameter and driven by a 100-hp., multi-speed, 440-volt, three-phase, alternate-current motor. The small fans will be moved to the new operations and used until the development warrants their replacement by the large Jeffrey fans.

The grades in the butt entries are 5 per cent. in favor of the loads, the cross-entries $\frac{1}{2}$ per cent. in favor of the loads and the main entry 5 per cent. against the loads. The rooms are driven as near level as possible, but the grade is not allowed to exceed 1 per cent.

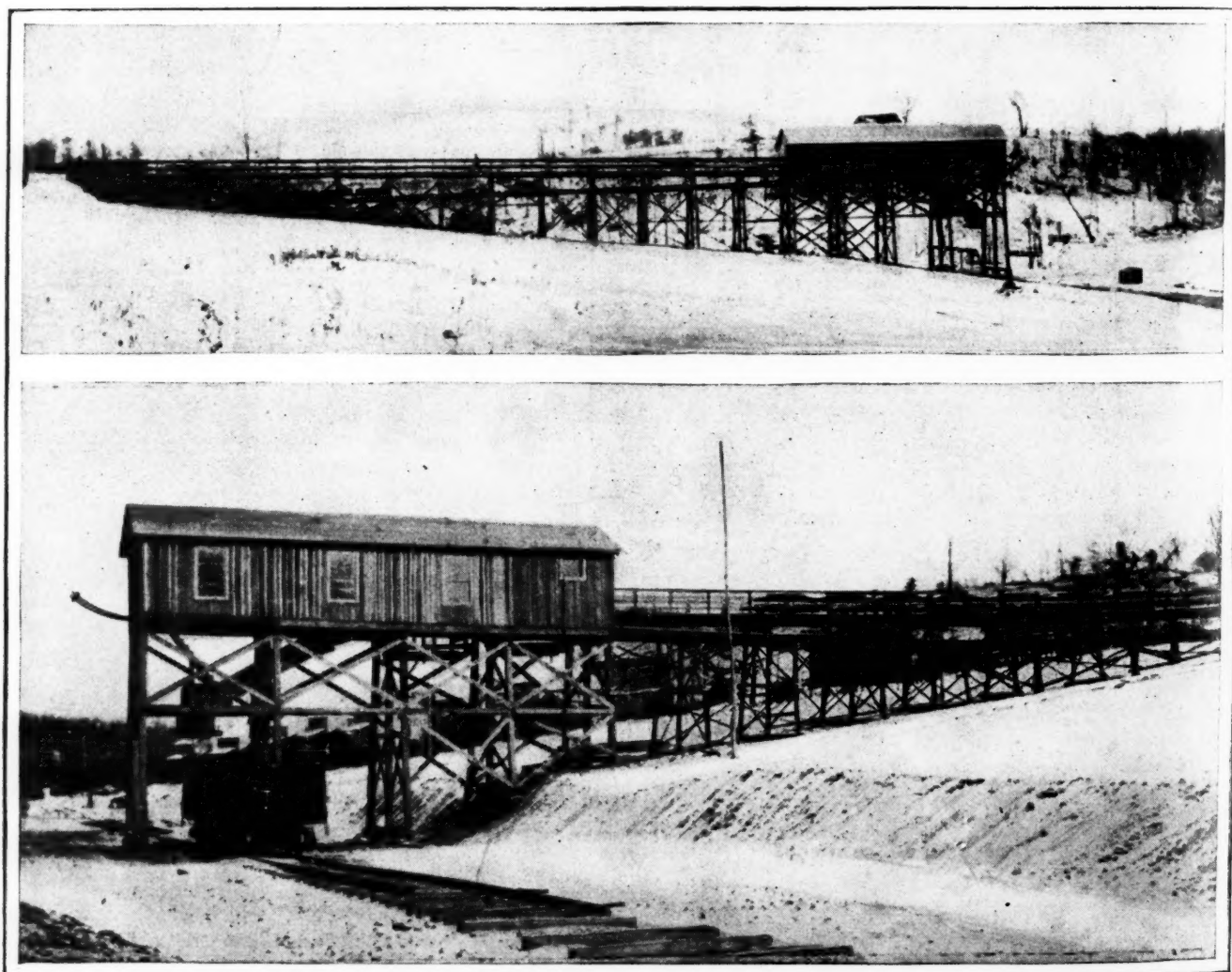


FIG. 4. VIEWS OF TWO OF THE TIPPLES BUILT BY THE COAL RUN MINING COMPANY
Above—Tipple at Nos. 4 and 5 mines. Below—Tipple at Nos. 6 and 7 mines

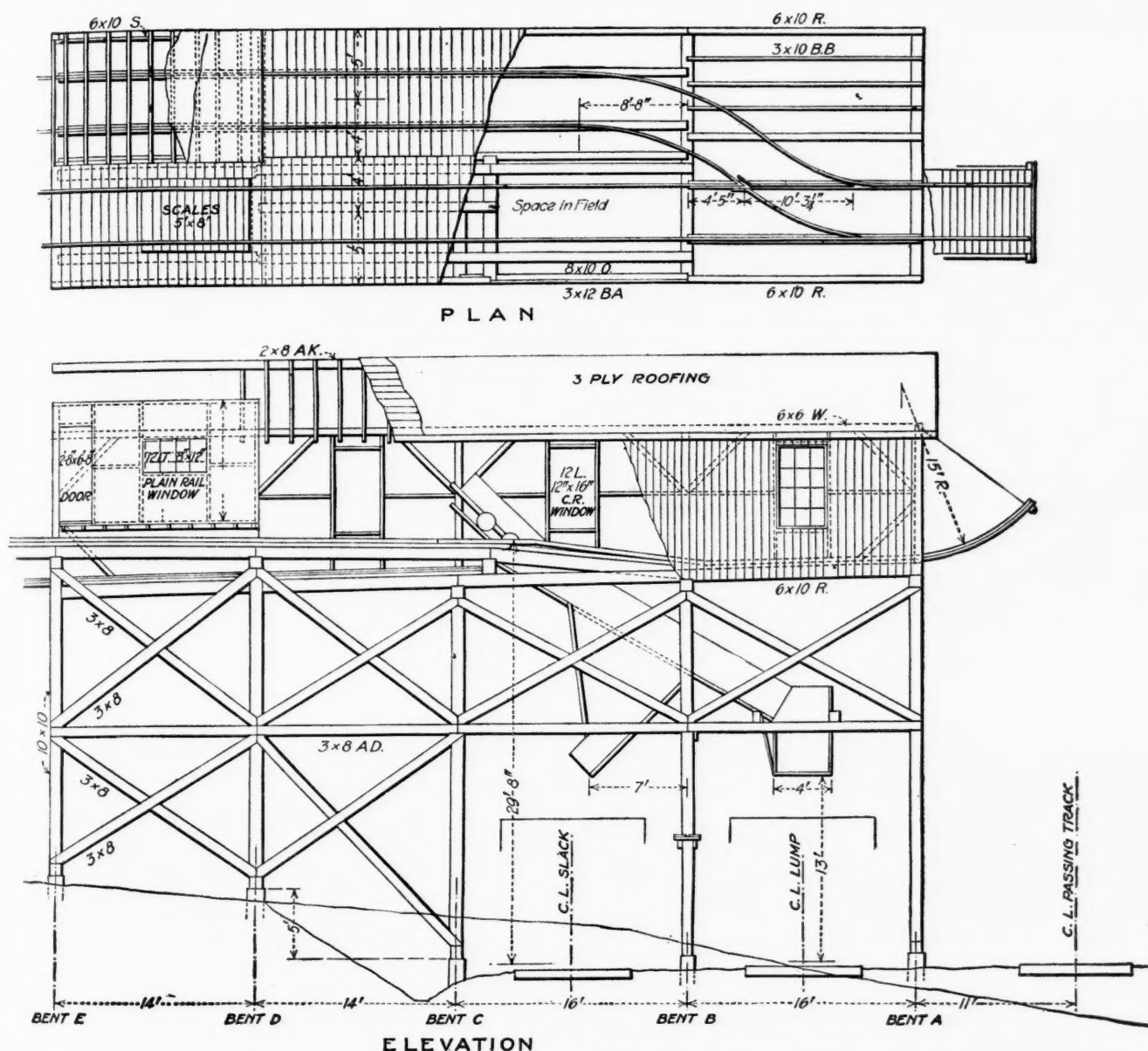


FIG. 5. PLAN AND ELEVATION OF STANDARDIZED TIPPLE

As the main headings are driven to the dip it is necessary to handle the water with pumps. At present only mines Nos. 1 and 3 have their main headings driven in any considerable distance and their territory developed. Therefore they are the only ones that have pumps. No. 1 mine has two 300-gal. triplex pumps, and mine No. 3 has one of the same kind and type. These pumps work against a head of 100 ft. and are operated by direct-current motors, the discharge pipe from which comes to the surface through a borehole.

The coal is undercut by Goodman machines of the shortwall type. The coal company now has sixteen of these machines and is adding as many more as it can get delivered. The coal is loaded into cars of 3000-lb. capacity. These cars are built of wood, are 9 ft. long, 4 ft. 4 in. wide across the top, 32 in. high, 42 in. gage and weigh 175 lb. They are equipped with hand brakes. Phillips car wheels are used. These wheels are greased once a month. The rail in the rooms is 16 lb., while that on the headings is 40 lb. Cambria steel ties are used for the room tracks and 5 x 7-in. wood ties are used on the haulage roads.

The company has three 10-ton and four 6-ton General Electric trolley locomotives. Besides these is one 6-ton Goodman cable-and-reel gathering locomotive. All these are at mines Nos. 1 and 3, the old operation. At mines Nos. 4 and 5 is one 5½-ton Iron-ton storage-battery locomotive equipped with Edison storage batteries. At mines Nos. 6 and 7 is another Iron-ton

TABLE I. LENGTH OF OUTSIDE HAUL AND GRADES

Mine No.	Length of Haul, Ft.	Grade
1	100	1.75 per cent. in favor of loads
3	300	1.75 per cent. in favor of loads
4	1,500	3 per cent. in favor of loads
5	1,500	Level
6	1,200	4 per cent. against loads
7	1,200	4 per cent. against loads

locomotive of the same size with the same equipment. Thus far these storage-battery locomotives have been used only for construction work, and they have given good satisfaction. It is the intention of the company to try them at gathering, and if they prove satisfactory they will be adopted for this purpose through all the mines, using the trolley locomotives only for main-line haulage.

The outside haulage problem is a simple one, as all the distances from the mine openings to the tipples are short, as shown in Table I.

Fig. 3 shows the general arrangements of the tracks from the No. 5 mine before ballasting (the track to No. 4 mine was not laid when photograph was taken). The opening to the No. 4 mine can be seen in the upper right-hand corner of the illustration. The track from this opening curves around the hill on a 2 per cent. grade and connects with the track on the curve in the foreground of the illustration.

Coal from mines Nos. 1 and 3 is dumped over a double tipple. The side nearest the No. 1 mine is an



FIG. 6. TYPE OF TWO-STORY HOUSES ERECTED AT COAL RUN

old tipple which is being remodeled. The No. 3 side is new and up to date, and is similar to the tipples at the other four mines with the exception that horned instead of crossover dumps are used. No. 1 mine has an output at present of about 600 tons and No. 3 mine of about 1100 tons a day. The production will be increased shortly to 1000 tons and 1200 tons respectively.

Coal from the Nos. 4 and 5 mines is dumped over the same tipple that serves mines Nos. 6 and 7. These tipples, standardized in design and exceedingly simple in construction, are of a type that has been adopted for use by this company and its associated companies throughout central Pennsylvania. The tipples at the Coal Run mines are designed for a capacity of 1200 tons a day and for the preparation of two kinds of coal, either straight run-of-mine or run-of-mine with the slack removed. The main timbers in the bents are 10 x 10 in. and the cross and longitudinal bracing is 3 x 8 in. The stringers for the loaded tracks are 6 x 10 in. The tipple proper consists of five bents, and as many more bents as are necessary are used to connect the tipple with the track grade. See Figs. 2 and 5 for construction details of the tipple.

The loaded cars are dropped by gravity on a 1½ per cent. grade to the scales on the tipple, where they are weighed. Thence they run by gravity to a crossover lump of the Phillips type, on which they are dumped. The car is then kicked off by the next loaded car and runs about 20 ft. to a kickback, which is suspended over the end of the tipple by iron rods, as is shown in Fig. 2. From this kickback the cars run on a 1½ per cent. grade to the empty track. Two tipples are illus-

trated in Fig. 4. The upper view is of the tipple at the Nos. 4 and 5 mines while the lower is of the one at the Nos. 6 and 7 mines.

At the tipple are three railroad tracks, one a passing track, one a run-of-mine loading track and the other a slack-loading track. The loading chute is so arranged (see Fig. 3) that one plate on bottom can be removed and screen bars put in its place.

One substation supplies power to all six mines. This substation is contained in one-half of a red brick building, the other half of which houses the machine shop. At present the substation equipment consists of one 25-cycle, 575-volt, 522-amp., three-phase, 6600-volt, alternate-current synchronous converter built by the General Electric Co. The alternate current will be changed later to 22,000 volts. The machinery for doubling the capacity of the substation has already been purchased.

The current is carried by a high-tension transmission line from a central station at Luzerne, 11 miles away. All the oil switches and transformers are in the substation. The feeders for mines Nos. 1 and 3 pass through boreholes to the mine workings.

Of the 85 houses now on the property 74 are four-room double frame houses two stories high. These houses are shown in Fig. 6.

Ask yourself what would be the financial attitude of Washington and Lincoln toward this war were they alive today. Do you think they would refuse to buy LIBERTY BONDS?

Bulgaria Has Only One Railroad Mine

The first coal mine in Bulgaria was opened by the government in 1879. Apparently it was soon worked out. The authorities then opened a mine at Pernik, about 15 miles from Sophia, on a branch railroad to the main line running from Sophia, southwesterly to Kustendil. It is a mine of some pretensions, producing, in 1916, 610,000 tons and employing one quarter of all the miners in the country. The coal is bituminous and runs in seams 6 to 10 ft. thick with light cover.

But though this is, or was, Nov. 10 of last year, according to the United States Consular report, the only railroad mine there are plenty of coal showings and many mines from the east to the west end of Bulgaria. Thus there is the government mine at Bobovdol in the southwestern part of Bulgaria and the Prince Boris mine, perched in the Balkan Mountains, operated on a government lease. The Boteff mine is near-by, and a German company also has several mines, first operated in 1912. The coal is 3 to 23 ft. thick but crushed as fine as sand and needing briquetting before marketing.

Further east are lots of coal areas between Gabrovo and Sliven, but the coal is only 2 ft. thick and pulverized. A coal mine, without any of the necessary facilities, is producing about 30 tons per day. Still further east are many other mines. Brown coal is found only 15 miles from the important Black Sea port of Bourgas. More northerly is an 8½-ft. bed of anthracite. Bulgaria is a land of possibilities if it only had railroads, capital and progressiveness.

Working Thin Beds by Longwall

By ROWLAND GASCOYNE
Johannesburg, Transvaal, South Africa

SYNOPSIS—Both mining engineers and miners are as a rule strongly prejudiced in favor of the method of working to which they are accustomed. Unless market conditions are abnormal it requires considerable courage to attempt the operation of a thin coal bed on the longwall system, when the only labor available has been accustomed to some other method. Generally speaking, however, longwall is the more economical system to follow in beds less than about 2 ft. 6 in. in thickness.

JUDGING from the questions frequently asked in *Coal Age* regarding the best way of working thin beds of coal, and the fact that longwall seems to be frequently recommended where conditions seem suitable, it would appear that in the States and Canada some attempts are being made to work abnormally thin beds of coal.

As a rule mining engineers brought up to longwall methods are as prejudiced against the adoption of other systems as those brought up to room-and-entry are to the adoption of longwall. The same prejudice prevails with the workmen, and nothing militates against the change from one system to another, even if conditions underground call for such a change so much as this prejudice.

A PUZZLE IN MINING COSTS

Take for instance the experience related by J. F. K. Brown in an article entitled "A Puzzle in Mining Costs" (*Coal Age*, Vol. 9, No. 6) wherein it soon becomes evident that the prejudice of the men against the adoption of longwall was as fatal to its success as the abnormal thinness of the measure—namely, 16 inches.

One would think that to attempt to work successfully under normal market conditions such a thin bed as 16 in. requires some courage, without being hampered by prejudice on the part of the workmen. To try a new method of working under such underground conditions, and in face of this prejudice, requires even more courage and tact; and it is no wonder that it was regarded as somewhat of a puzzle.

With a bed as thin as 16 in. under 30 ft. of shale, which again is overlaid by 30 ft. of sandstone, the conditions for longwall working ought to be more favorable than working by room-and-entry. An engineer accustomed to longwall would probably always adopt that method with such a thickness of shale for a roof, but in the successful working of longwall the floor has also to be taken into consideration as well as a host of other conditions.

It would perhaps be an advantage and more easily understood if we attempt to follow and deal with the difficulties as they arose in Mr. Brown's experiments. In the first place to make a longwall face parallel to the "cleats" cannot always be recommended. In a bed of fragile coal the proportion of small coal made by work-

ing parallel to the cleats might make all the difference between working at a loss and a profit, and with a shale roof the cleats might act as lines of weakness and thus add to the timbering difficulties. With a hard coal and sandstone roof, working parallel to the cleats might prove an advantage. All such small details must be taken into consideration.

With regard to timbering it was stated that the men had never previously worked in longwall workings, and were prejudiced against the system. Under these circumstances it is impossible for the longwall method to have had a fair trial, unless there was some one practically acquainted with all the troubles of this system to act as instructor and take a leading part. It is no wonder that the roof was kept in what Mr. Brown describes as a state of "animated suspension." Had he continued to work under these conditions until the "top weight movement" came on there would probably have been much more animation observable, and less suspension.

With a roof like the one described and the working face running parallel to the cleats the area of roof exposed must be kept down to a minimum and as little of it permitted to rest on timber as will allow of the conveyance of coal along the face. This is shown by the fact that the timber along the face had to be frequently changed, a practice always to be avoided if possible, as in itself it may be regarded as proof that the face is not being advanced at a sufficient rate. The acceleration of the speed of the face would also, as suggested, reduce the difficulty experienced in transporting the coal.

SHOULD HAVE ADHERED TO LONGWALL

It is evident that Mr. Brown's failure in the first section of longwall opened was due to the causes stated, and it is perhaps fortunate that work was suspended before the top weight came on, otherwise the whole of the workings might have collapsed.

Mr. Brown did not state whether the waste was closely packed. Presumably it was, but it may be pointed out that with such a roof, until the floor and roof have come together, and the gateway is constructed in solid ground, there would be little hope of settled conditions prevailing. It may be true that work was stopped just when earth movements were commencing to show themselves, but had the longwall method of working been persevered with until the conditions mentioned above had prevailed, there would perhaps be quite a different tale to tell about the adaptation of the longwall method of working to this thin bed of coal.

When we come to consider the No. 2 section of longwall in the experiment mentioned by Mr. Brown, we find that several of the suggestions mentioned above with regard to the No. 1 section were adopted with advantage, and it would almost appear that had operations been continued some degree of success would probably have been obtained.

Working at right angles to the cleat and reducing the exposed roof to a minimum seems to have proved bene-

ficial, while the timbering seems to have been better arranged. It is to be noticed, also, that to facilitate the loading of the mine cars a cut was made in the floor of the gateway and small cars used along the face. No information is given as to the method adopted in stowing up the wastes so as to steady the roof. It is presumed that every care was taken to stow the waste as solidly as possible, but whether packs of either stone or timber were used nothing definite is stated.

An intermediate pack of waste often saves considerable timber and should be used wherever practicable, and props regarded only as instruments of safety to prevent falls in the working place and not to resist subsidence, which in any form of longwall working is impossible to attain. It is impossible to say whether in the course of time it would be possible to use less timber in the shape of packs in the gateway, and thus reduce the cost of timber. At all events, in the starting off of a longwall face to stint the packs of timber would be doubtful economy. It is pointed out, however, that although the No. 2 longwall experiment was more successful than the No. 1 experiment, the results were not yet entirely satisfactory, the troublesome part being the removal of the coal and rock from the face to the mine mouth.

In one place Mr. Brown states that no attempt was made to build up the cavity formed by taking out the coal, as no stone fit for the purpose was obtained from the roof. I hope this does not mean that the waste rock made at the face was taken out of the mine while empty spaces were left in the goaf in which it was possible to stow this waste rock. If this waste rock was not deemed good enough to build packs with, there can be no excuse for leaving empty spaces in the waste and sending rock out of the mine, which, however unsuited for packs, was valuable for stowing material.

REMOVAL OF WASTE MATERIAL EXPENSIVE

Any system of working which involves the removal of a larger quantity of waste material than coal must necessarily be expensive, and the question arises could not this handling of waste material be reduced? The extraction of only a thickness of 15 in. of coal does not leave much room for the stowage of waste rock, and if to work 15 in. of coal it is absolutely necessary to take down 18 in. of roof, there seems little hope of avoiding the transport of waste rock out of the mine. Many collieries are working beds of coal 2 ft. and 2 ft. 6 in. thick successfully by longwall, without taking down the roof in the working places, and if only Mr. Brown can reduce this taking down of the roof in the working places, say to the extent of one-third, the benefit ought to be considerable.

With such a thin bed as 16 in. Mr. Brown gives interesting figures as to the comparative costs between longwall and pillar-and-room working. The outstanding features of these are the higher costs of timbering and tramming in the longwall system as compared with the pillar-and-room working. It is easy to understand perhaps why timber should cost more in longwall than in pillar-and-room, but one would expect that this extra cost would be more than counterbalanced by cheaper mining and stonework. These Mr. Brown estimates the same in both systems. Tramming costs in longwall ought not to be more than in pillar-and-room under

the same conditions underground. But it seems reasonable to lay the blame on the amount of waste rock handled, which brings us back to the thinness of the bed worked. Mr. Brown suggests that the adoption of mechanical haulage would prove a solution to all these troubles. This, of course, will depend upon the distance the coal has to be moved, but it ought not to have any bearing on the mining merits of the two systems of working discussed, as practically the same amount of transportation will have to be done in both cases.

The problem here to be solved is how to obtain an output of 50 tons per day from a bed of coal 15 in. thick. There is no spare power available, so that coal cutters are out of the question. If the longwall system was adopted and the necessary power available, five coal cutters and the use of coal conveyors at the face would solve the whole question, but we are asked here to obtain an output of 50 tons of coal per day with no mechanical facilities worth mentioning.

HAVE GATEWAYS AS FAR APART AS POSSIBLE

We will assume that the longwall method of working is decided upon, and in such a thin coal bed it will be advisable to have the gateways as far apart as possible. I would fix them 100 yd. apart so as to save the cost of stonework and its handling as much as possible. Each gateway would therefore serve 50 yd. on either side. I would use small cars to convey the coal along the faces to the gateways. The floor in the gateway would have to be taken up to make the requisite height, say 6 ft.

To obtain the required amount of coal five stalls would be necessary, each 100 yd. long, and the face would advance about 4 ft. per week. Every effort must be made to keep the waste down so that it can be all stowed in the goaves, and if possible none sent out of the mine. The packs along the gateway sides should be built 12 ft. wide and strengthened with old timber chocks, and if intervening packs between the gateways can be built to steady the roof, so much the better. The solid stowing of the goaf must be kept as close to the working face as possible, so as to reduce the weight on the timbers.

If these instructions are followed five or six working places 300 ft. in length ought to produce 50 tons per day. To increase the output additional working places would of course be required. Gateways 100 yd. apart may seem abnormal, but to work a 15 in. bed of coal successfully such a distance between the gateways seems necessary in order to reduce to a minimum the unprofitable handling of stone.

In the same issue of *Coal Age*, under the heading of "Inquiries of General Interest," a novel proposition is made to run an endless rope along a longwall working face, in order to reduce the number of roads and their maintenance.

The thickness of the bed in this instance is said to vary from 20 to 27 in., while the depth is given as 110 ft. The coal measured is overlaid by 2 ft. of soft, sandy shale, followed by 2 ft. of impure, compact, hard coal. Then follows 6 ft. of block slate overlaid by sandstone. The roadways are driven 30 ft. apart. The inclination of the bed is not stated, but as it is proposed to use an endless rope along the face, it may be presumed that the inclination is small. As the coal is said to be hard,

probably the cutting is done in the 2 ft. of soft, sandy shale, so that the height along the working faces will probably be about 4 ft. The impure coal is taken down in the roadways, making them 6 ft. high in the first construction.

The object sought here by the inquirer is to reduce the number of roadways to a minimum, as also their cost of maintenance. At the outset it may be stated that the number and cost of the road can not be materially reduced without complicating matters along the working face by installing an endless rope, even if it was practicable to do so. The roof must be good to allow such a suggestion to be seriously made, since clearly any fall of roof along the face would incur serious stoppages.

The question one is inclined to ask is why are the gate roads, in face of their cost, constructed only 30 ft. apart, which for a bed of coal averaging only 2 ft. thick seems quite unnecessary? Why not have the roadways farther apart by abandoning three out of every four of the present roadways? If the roadways are constructed so close together with the object of supporting the roof by the packs, why not build packs in the goaf without going to the expense of constructing roadways? If, as supposed, the 2 ft. of soft sandy shale is taken down at the face, it ought to go far toward filling the goaf in a solid manner and thus reduce the number of waste packs required.

WHY NOT ONE GOOD MAIN GATEWAY?

It would be interesting to know at what distance from the face the roadways when brushed up to the block slate become too low to use without re-brushing. If all the gateways need this re-brushing, would it not be more profitable to make one good main gateway, say every 250 yd., even if it involved the brushing of the block slate, and so cut off three gateways on either side by new slant roadways when the old roads got too low for use without re-brushing?

It is, of course, difficult to make suggestions when all the facts and conditions are not known, but providing the conditions are as surmised, the making of a roadway over 30 ft. in the exploitation of a coal bed averaging only 2 ft. in thickness seems quite unnecessary. The primary use of roadways is of course to facilitate the removal of the coal from the working face, and it ought to be manifest that fewer roadways are required for this purpose in a 2-ft. bed, say, than where the seam worked is 6 ft. thick or over. To make roadways only 30 ft. apart in a 2-ft. seam, appears therefore to be incurring unnecessary expense, unless some satisfactory explanation can be given for such an unusual practice.

In a case like this the minimum distance between the gateways ought to be, say 120 ft., and even this may prove too small if the roof is good, or where it is possible to use mechanical coal conveyors along the face. The objection may be urged that if the number of gateways be reduced, the working face will not advance as rapidly, and the roof will rest longer on the timbers. A little reflection, however, will show that in a thin coal it is not the number of gate roads that causes the face to advance, but the number of machines or men put to work at the face.

To increase the number of gate roads by placing them only 30 ft. apart would rather deter than advance the face, owing to the additional labor required in con-

nection with the construction and brushing of these passages, especially if that labor could be utilized along the face. There may be of course some prejudice among the men against working in longer places than 30 ft., but a little reflection will show that in a thin coal bed this extra construction of gateways must add materially to the working costs.

In the two instances already dealt with the thinness of the beds, say from 16 in. to 24 in., makes the propositions anything but attractive and demands an abnormal selling price to enable the collieries to be worked at a reasonable profit. Coal-cutting machines and coal conveyors along the face are to be recommended, but it frequently happens that these appliances are not available.

There can be little doubt that where the underground conditions are favorable the longwall method of working ought to be more suited to the extraction of thin beds than the pillar-and-stall system. In a bed of coal, say 2 ft. 6 in. thick, possessing a good roof, where mechanical coal cutters and conveyors can be installed along the face, no great or noticeable difficulty ought to be experienced; but where the thickness is less than 2 ft. 6 in., many difficulties are encountered, the most formidable of course being the large amount of stone handled in these ultra-thin beds.

Prejudice on the part of the workmen against the longwall method of working is a serious obstacle and one exceedingly difficult to overcome. It may be found expedient to counteract this prejudice by introducing a compromise between pillar-and-room and longwall working, so that by a process of evolution as it were the longwall method is gradually introduced. In instances like this it may even be necessary to adopt retreating longwall where underground conditions will admit of this method being practiced. Generally speaking, however, where the coal bed is under 3 ft. thick and conditions are suitable, the longwall method of working ought to be adopted.

Cost of Producing Anthracite

The cost of producing anthracite coal ready for market, according to data compiled by the general committee of anthracite operators of Philadelphia, Penn., divides roughly into 60 per cent. for mining, 30 per cent. for preparation and 10 per cent. for taxes, insurance, workman's compensation, royalties and fixed charges. Of the total cost of production about 70 per cent., sometimes above 75 per cent., is labor cost. The average production of anthracite per mine worker per working day for ten days prior to the war was 1.96 tons. For the decade to 1916 the breakers ran an average of only 221 days a year. The largest number of mine workers in the anthracite regions was 180,000 in 1914. It averaged 175,000 to 177,000 prior to the war, but is now 153,000.

As the mining industry has been more and more scientifically conducted, the waste of anthracite—that left in the ground and that discarded on the dumps—has been greatly reduced. In 1887 steam sizes made only 6.9 per cent. of the total anthracite sent to market. For 1917 30.7 per cent. of all was of the small steam sizes—coal which 25 years before would have been thrown away as useless.

The Byproduct Coke Oven, Its Coke and Its Byproducts—I*

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SYNOPSIS—*The United States may lag behind Europe in the percentage of coke produced by the byproduct process but not in the efficient operation of such byproduct ovens as are in operation. Advantages in the use of silica brick and the gain derivable from great intensity of operation.*

THE technical and engineering problems in the manufacture of coke are today the problems of the byproduct oven. Except in a few special localities, practically no beehive ovens have been built in the United States for the last 5 or 6 years except as renewals of old plants, and during these years the total number of beehive ovens in existence has been steadily falling. On the other hand, the number of byproduct ovens has increased from 4624 in 1911 to a total of about 7660 in operation at the end of 1917; with 2800 building this makes a total of about 10,460 which will be in operation in 1918, or shortly thereafter.

Preliminary Government estimates place the total production of coke for 1917 at 56,600,000 tons, the largest tonnage in the history of the industry. Of this 34,000,000 tons or 60 per cent. was beehive, and 22,600,000 tons, or 40 per cent. was byproduct coke. Some time in 1918 the production of byproduct coke should pass the beehive output, and when the byproduct ovens now building are completed the total byproduct capacity will be about 40,000,000 tons of coke per annum, which is over 70 per cent. of the record-breaking total coke production of 1918. The reasons for these changes in the coking industry are familiar to all of us, and need not be discussed here.

IMPROVEMENT IN OVEN DESIGN

Since the byproduct oven was brought to this country from Europe, in 1892, it has been radically improved, and from the point of view of American metallurgical practice it is safe to say that the American ovens are superior to those of Europe. The points of superiority are mainly those of larger units and larger output per unit, and the greater extent to which labor-saving machinery has been introduced. The increased output is largely due to the use of silica refractory material, which permits higher heats and shorter coking time than are employed in Europe. The modern American oven will carbonize commercially more than 20 tons of coal per day, and contrary to the European idea that slower operation is necessary to conserve the plant, this rate of operation with only current repairs, can be maintained for an indefinite time. The byproduct oven

is not old enough in the United States to make it possible to state from experience how long an oven can be operated at maximum efficiency. There are a number of plants in different parts of the country which were built 16 or 18 years ago, which are more efficient today than in the first year of operation, and which show costs of operation which compete well with those of the most modern plants.

The accompanying illustrations, Figs. 1 and 2, show the earliest and the latest development of one of the

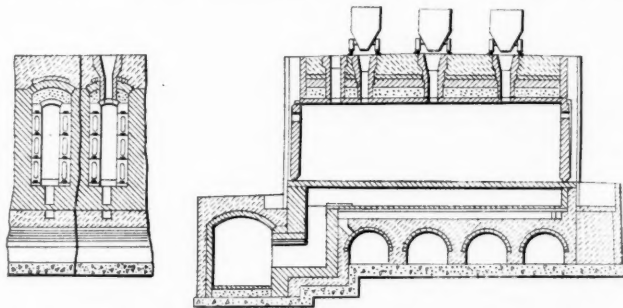


FIG. 1. EARLY DESIGN OF BYPRODUCT OVEN

prominent types of ovens in use in this country. It is not the purpose of this paper to discuss mechanical details of oven development, and the illustrations show sufficiently well the principal changes in the design. The first ovens had a capacity for carbonizing 4.4 tons of coal per day, as compared with the present capacity of over 20 tons mentioned above.

The early ovens were economical in heat consumption because the heat in the waste gases was utilized efficiently in raising steam for the operation of the plant. On account of the growing demand for oven gas for metallurgical and other uses, the change to the regenerative type of oven has been general. While this type of oven is not so economical of the total heat produced by the combustion of the gas as is the combined oven and boiler plant, it makes available for use half again as much of the surplus gas as did the older type of oven. Modern ovens require for carbonization of the coal less than 40 per cent. of the total heat in the gas produced.

DESCRIPTION OF OVEN

Fig. 2 illustrates one of the principal types of the modern oven, and a few words of description may be appropriate here. The byproduct oven is essentially a closed chamber, heated from the outside, and in the coking process the volatile matter of the coal is distilled off with careful exclusion of air. This point distinguishes it in principle from a beehive oven, where the heat is generated by combustion within the oven itself, with the resulting destruction of everything except the coke. The oven shown consists of a chamber about 36 ft. long, 12 ft. high, and of a width depending upon the coal that is to be carbonized. In American practice the

*Paper presented at the New York meeting of the American Institute of Mining Engineers, February, 1918, entitled "The Byproduct Coke Oven and Its Products."

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average width varies from 16.5 to 21 in. Modern ovens usually have about 2 in. of taper toward the discharge end to facilitate the pushing of the coke.

The ovens are usually heated by a portion of the gas recovered from the distillation of the coal, although sometimes producer gas is substituted. In all the successful ovens this gas is burned in a series of flues which control the travel of the burning gases and distribute the heat over the entire side of the oven. The success of any oven design depends very largely upon its ability to distribute the heat evenly over the entire surface which forms the wall of the oven, and it is by no means an easy problem to control this distribution accurately over an area of 432 sq.ft. In some ovens the flues composing the heating system are vertical and in others horizontal. The oven shown is the chief exponent of the latter arrangement.

HORIZONTAL VS. VERTICAL OVEN FLUES

Both systems have their advocates, and the details of both have been worked out so that they can be relied upon to give the uniformity of heating necessary for satisfactory operation. Naturally the representatives of each system prefer their own type. The advocates of the horizontal flues find them more accessible for supervision, easier to control, and easier to maintain. The somewhat lower temperature that can be maintained in the upper flues under all conditions of operation is a desirable feature for the best results. One feature of the oven shown is the strong middle wall between the ovens extending from the foundation to the top, which gives the structure great stability and permanence and acts as a heat reservoir to help maintain uniform temperatures, which is important, because when a new charge of cold wet coal is dropped in the oven there is a great demand for heat to start the coking process quickly. These middle walls also permit any oven to be repaired or entirely relined with a minimum interference with adjacent ovens.

Fig. 3 shows the flow of the air and gases through the system. From this illustration it will be noted that one pair of dampers near the stack does all the reversing of the air and gas. The cold air enters the system from a fan located at a point near these dampers, flows through one of the two main flues, and is distributed to the regenerators by a system of firebrick slides. The air is heated in the regenerators to about 1000 to 1100 deg. C. before entering the flue system of the oven and meeting the gas to be consumed.

It will be noted that this gas is supplied at several points in the flue system, and that it flows steadily through the supply pipes, its direction in the oven being reversed by the reversal of the current of air, so that no attention need be given to this point by the operator. That is, when the currents are flowing upward through the flue system each gas stream is bent upward and burns in the flue above the gas pipe, which is opposite the partition wall. When the flow is downward, the gas streams are bent downward. By means of these several supplies of gas the heat is supplemented as needed and all the air supplied is consumed by the last admission of gas. The products of combustion pass out to the other regenerator and thence to the reversing dampers and chimney in the same manner as in an openhearth furnace.

In the earlier types of ovens, when luminous gas was used, much of the heating was done by radiation, but in modern practice, where the benzol is removed from the gas, the combustion is not luminous and the heating is done mainly by conduction. To this end, in the system described it has been found quite advantageous to maintain a reasonably high velocity of the hot gases in the flues, making use of the principle which has been developed in some types of hot-blast furnace stoves and other furnaces, where a high velocity of the hot gases has been shown to be most effective in the transfer of heat to the adjacent surfaces because it sweeps away the sluggish layers of gas lying against the surfaces, which, if not removed, would form efficient non-conductors of the heat which we desire to transmit to the coal charges in the oven.

OPERATION OF BYPRODUCT OVEN

The total amount of heat delivered to the combustion flues is usually regulated by the pressure on the supply of air and gas; and the distribution of the heat among the various flues is controlled by a simple regulation of the relative amount of gas to each flue. Each flue may be conveniently inspected through a peephole accessible from the working platform outside; and it is found that the convenience of this inspection and control is an important factor in obtaining the best heating conditions.

The coal is charged into the oven from a hoppers larry car running on the top of the oven structure, the fuel usually being delivered through four charging-holes. The fifth hole, shown in the illustration, serves to carry off the volatile products of the distillation. The

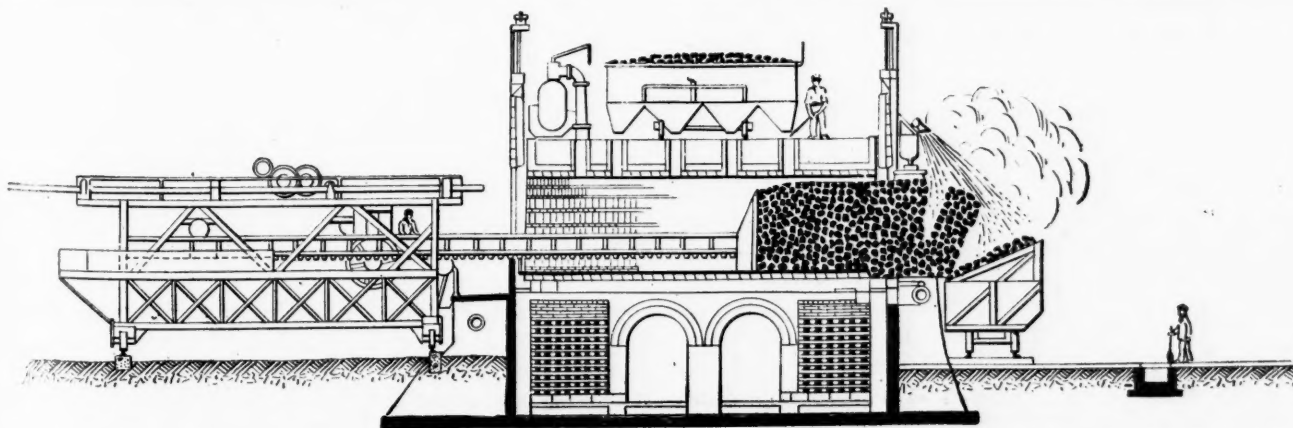


FIG. 2 MODERN BYPRODUCT OVEN WITH CHARGING LARRY, DISCHARGING RAM AND COKE CAR

coal is leveled, after charging, by an auxiliary ram on the coke pusher, the space being left between the top of the coal and the top of the oven for the outgoing gases to reach the point of discharge.

Upon completion of the coking process the doors are raised, and the coke is pushed out by an electrically operated ram. The doors are then lowered and sealed and the oven is ready for another charge. Many attempts have been made to develop a mechanically sealed

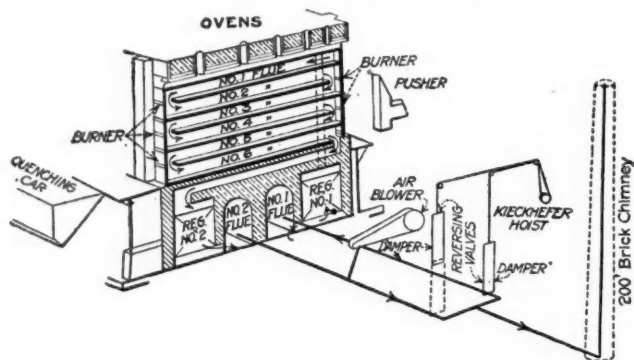


FIG. 3. DIAGRAM OF OVEN VENTILATING SYSTEM

door, but the conditions of operation make this mechanical sealing a difficult problem, and nearly all plants still use the mud joint. Careful designing of the door and its seat make this mudding a much less serious matter than might be supposed.

USE OF SILICA BRICK

As stated above, silica brick is largely used in modern byproduct oven construction. There seemed at first many obstacles to its successful use for such construction, the principal objections being the large amount of expansion of the brick when heated and the tendency to spall, due to sudden changes in temperature. When silica brick was first used in the crowns of beehive ovens it was thought that it would be an absolute failure, but it was unexpectedly successful. It was first employed in byproduct ovens at the plant of the Cambria Steel Co. and was soon after generally adopted.

It has been found that, since most of the expansion takes place below a red heat, the variations in temperature during operation do not give any trouble, and the superior resistance of silica brick to high temperatures and its satisfactory conductivity under operating heats make it a superior material. Notwithstanding its success in American practice, I understand it has not been employed to any extent in Europe, and only a few years ago some prominent English brick makers stated that they did not believe it could be employed, notwithstanding statements that came from America.

SIZE AND WIDTH OF OVENS

The cubic capacity of a byproduct oven has increased nearly four-fold since its first introduction into this country. The larger capacity has the advantage of reducing the cost of operation per unit of product, and the smaller number of units also reduces cost of construction and repairs. Increases in length and height of the oven chamber have no effect on the product and are limited only by structural and heating conditions. The width of the oven, however, is a more important factor in the coking process.

In the early days of the byproduct oven in Europe it was thought that the lean coals of Belgium, running as low as 15 per cent. volatile, required a very narrow oven, perhaps not over 14 in. wide, while for high-volatile coals a width of 20 in. was not infrequent. American practice has not demonstrated any such simple rule as this, and perhaps the reason may be found partly in the fact that oven plants are generally located at the point of consumption of the coke. Hence mixtures of coals can be more easily obtained, and for this reason most plants operate on about the same average percentage of volatile matter. It has not been definitely shown in American practice that a particular width of oven is best suited to coal of a certain composition. Narrower ovens have certain advantages.

First, a faster coking time per inch of width with a given flue temperature.

Second, a somewhat higher yield of byproducts.

Third, a somewhat more uniform cell structure as between the portion of the coke nearest the wall and that nearest the center of the oven.

On the other hand, the larger number of operations of the oven crew when handling the narrower ovens increase the labor cost and the repairs. It has yet to be developed what is the best oven width to average these conditions. The widest ovens operating in this country have an average width of 21 in. and the narrowest 15 inches.

It will probably take much further investigation to determine where between these limits can be obtained the best equalizing of conditions, and whether the mixture of coals naturally available for a given plant will be a factor in determining the best average width. Some coals require higher temperatures than others to produce the best coke, but it is not clear that this fact will lead to the selection of wider ovens for such coals. It is not clear that we can say today that any width is definitely the best for a given set of conditions, but much study is being given to this subject, and we may before long have some better data.

QUALITY OF COKE

In the discussion of this subject I shall not go into the chemical composition of coke, since the permissible amount of any impurity for a given use is well understood, and the different elements are easily determinable. The physical structure of the coke is quite as important as its chemical composition. It is the physical structure which gives coke its advantage for metallurgical work over other forms of solid fuel, and it is important that the structure should be adapted to the conditions under which the coke is to be used.

The blast furnace is the great coke consumer. In the days of the beehive oven one kind of coal gave a coke with a certain physical structure, and another coal gave another structure. Furnaces either adapted their practice to the coke, or changed their coke supply. Coke was recognized as hard or soft, porous or dense, and that was about all we knew regarding physical structure.

Mr. Brassert says in his paper on "Modern American Blast Furnace Practice," read in 1914, that "the early coke produced in our byproduct ovens, even from the same coals as were successful in the beehive oven, burned too slowly and made our furnace operations exceedingly difficult, by preventing rapid and continuous movement

of the stock. The lack of knowledge and experience along these lines was responsible for the slow progress attending the introduction of byproduct ovens in this country." The economy of the byproduct oven practically forced its adoption by the furnace operators, and for several years, as Mr. Brassert states, "at a number of American plants byproduct coke has been made which rivals in quality our best beehive product."

The byproduct oven, with its variable mixtures of coals, variable heats, coking time, width of oven, fineness of coal charged, and other controlling factors, permits a control of coke structure formerly impossible. The problem is to determine first, what is the structure best adapted to standard furnace practice, while recognizing that special practice requires modifications of structure; second, what conditions are necessary to produce that structure.

Notwithstanding the general acceptance of Gruner's theory of ideal combustion in the furnace, the produc-

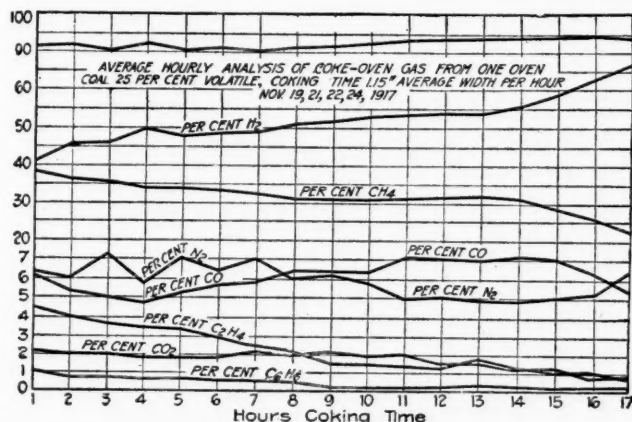


FIG. 4 SHOWS WHAT GASES ARE MADE EVERY HOUR OF THE COOKING PROCESS.

Upper line shows percentage of combustible gas in oven

tion of a high thermal heat at the tuyeres is of the first importance, and the best coke is that which reaches the tuyeres in proper condition to produce the highest temperatures in the tuyere area, and in just sufficient quantity to do the amount of work required there under the conditions produced at this maximum temperature.

The ideal coke is one which will descend through a furnace shaft to the combustion zone in front of the tuyeres with the least loss from attrition and oxidation, and when it arrives there will burn at the highest possible rate. Of course, there are paradoxical qualities. However, Mr. Walther Mathesius points out in his interesting paper on "Chemical Reactions of Iron Smelting" that "modern American coke-oven practice has made enormous strides toward approaching this apparently paradoxical ideal." He stated that this is accomplished by producing coke with an open-cell structure, in which the cell walls themselves are amply strong and well protected by a graphitic coating.

The time of contact of the blast with the coke in the tuyere area can be only a few seconds and the speed of any chemical reaction decreases as the relative quantities of reacting and resulting substances approach equilibrium. Therefore, the farther these relative quantities remain from the status of equilibrium, the higher the rate of resultant combustion. With the facts now before us I am disposed to believe that we should, in seeking to produce the best blast-furnace coke, aim to

produce an open-cell structure, with cell walls strong and hard. Later experience may, however, show that there are other requirements that are not now known to us. It is not necessarily true that the open-cell structure is the same thing as a high percentage of cell space. The advantage of an open-cell structure is that it gives the oxygen of the air easy access to the carbon. It is

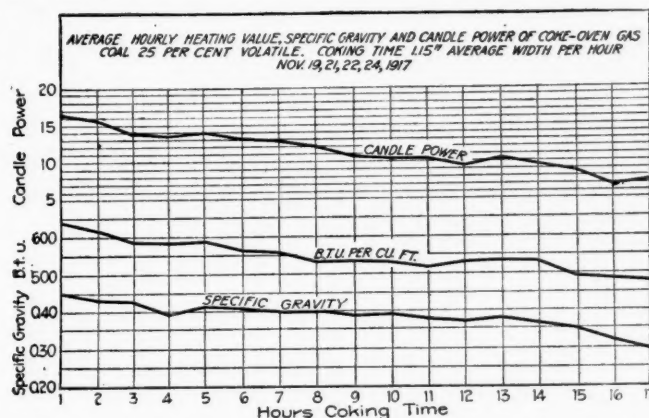


FIG. 5 GRAPH SHOWING LIGHT, HEAT AND WEIGHT OF COKE-OVEN GAS HOUR BY HOUR

entirely possible that a coke of very fine cell structure, having say 50 per cent. of cell space, might offer less surface for prompt combustion under practical conditions than another coke containing larger cells but having the same percentage of total cell space.

The composition of the cell wall, which it is agreed should be hard, thin and strong, and, according to Mr. Mathesius, covered with a graphitic coating that is smooth and bright, is a much more complicated matter. What are the conditions of coal mixture and coking which produce this kind of wall? I think we have not yet found the answer to this question, although we know some of the conditions that are favorable to this result. The coal mixture, the degree of fineness of grinding, the coking time, and the heats are probably all factors.

Our search for the best coke structure to meet a given set of furnace conditions is not an easy one, but we know better which path to start on than we did even a few years ago. Are we not agreed on the following points at least?

1. The coke must be hard.
2. It must have an open structure; that is, cells of good size, filling about 50 per cent. of the coke volume.
3. It must have a high rate of combustibility.

Can we add anything more to this list? Some investigators have concentrated their comparisons on the rate of combustibility, but I cannot believe that this test alone is sufficient to determine the best coke structure, because it ignores one of the sides of the paradox. While the best coke must burn rapidly at the tuyeres, it must also resist attrition and oxidation during its descent in the furnace. Good-sized cells and a good percentage of cell space, coupled with a hard structure, would seem to give a coke corresponding to Mr. Mathesius' definition. Testing the rate of combustion has been a help to us, and I hope we will find a test for hardness of structure better than the crushing of the 14-in. cube specimens, over which so much time used to be spent in the days when John Fulton wrote his book on "Coke."

(To be continued)

Two Readers Condemn the "Resistless Stopping"

This from John Verner of Chariton, Iowa. He believes that an open cross cut betters the air supply and so helps to feed the explosion. A weak stopping may therefore aid in extending the explosion and a strong stopping may help to confine it to a small area.

I HAVE read the report of the proceedings at the Coal Mining Institute of America, as published in *Coal Age* of Dec. 15, 22 and 29, 1917, and I was especially interested in the discussion of the question: "What are the prime requisites of a satisfactory permanent stopping?" The discussion of the question apparently was wholly confined to the consideration of the probable effects of strong or weak stoppings on the propagation of mine explosions.

Mr. Affelder, who propounded the question, stated that in a certain mine the stoppings were so constructed that they would break down in the presence of a comparatively low pressure. An explosion occurred in that mine and soon came to an end, the stoppings in its path being destroyed. In view of this Mr. Affelder expressed the opinion that the early subsidence of the explosion appeared to be due to the collapse of the stoppings affording release of pressure and to the opportunity given in consequence for the expansion and dissipation of the heated gases. For this reason Mr. Affelder believed that the presence of weak stoppings was of value in checking an explosion.

END OF DRIFT HARD PLACE TO START EXPLOSION

According to the report in *Coal Age*, "the institute did not take very kindly to W. L. Affelder's resistless stoppings as a means of limiting explosions in coal mines," and the view was expressed "it is questionable whether the release of pressure has much effect except at the point of origin."

It has been found that by using the same means of ignition it is much easier to start a dust explosion in a small than in a large area and that reproduction of explosive combustion in unusually high and wide places has sometimes failed to occur. These well-known facts probably gave rise to the theory that release of pressure or opportunity for the comparatively easy projection of the heated gases tends to prevent or obstruct the start and propagation of a dust explosion. The theory, however, is not in harmony with the facts.

The experimental gallery at Eskmeals is about 800 ft. in length and 7 ft. 6 in. in diameter. On page 496, Vol. 6 of *Coal Age*, this statement appears: "It has been found extremely difficult if not impossible to start a dust explosion from a shot fired from the face or closed end of the gallery and to assure success the shots are fired 50 ft. from the closed end." In the absence of the opportunity for the expansion of the heated gases in opposite directions it was extremely difficult if not impossible to start a dust explosion, whereas with the

opportunity provided, the start of the explosion was assured.

On page 39, Bulletin 56, of the Bureau of Mines, is found a description of tests made at the Bruceton mine, showing practically the same results as at Eskmeals. Tests were first made in the Bruceton exterior gallery, consisting of a steel tube about 100 ft. in length, 6 ft. 4 in. in diameter, closed at one end by a plank stopping and open at the other. The cannon was placed against the plank stopping of the closed end and a hole was cut through the stopping opposite the bore of the cannon. Shots fired from the cannon into the gallery produced explosions without fail.

SUGGEST THAT MR. AFFELDER EXPLAIN THIS

This exterior gallery is so arranged that it can readily be connected with the mine itself. When the gallery was so connected and in consequence the distance from the cannon to the opening was increased from 100 ft. to approximately 1200 ft. with two right-angled turns greatly increasing the resistance to the rapid projection of the heated gases from the shot at the closed end, the effect, as the report states, was striking. When the shot was fired in the steel gallery with its open end affording an easy release of pressure, the flame not only traversed the full length of the gallery but extended into the air for many feet, but, under otherwise the same conditions, when the gallery was connected with the mine, the dust was inflamed only in the first half of the gallery and the mine itself was not affected at all.

Here is another significant fact. It has been found that old mines, where the mine resistance is great, are practically immune from dust explosions and that they occur frequently in new mines where the mine resistance is comparatively small.

It is well known that the easy removal of insufficient tamping increases the danger from a blown-out shot and that an increase in the depth of the hole and a corresponding increase in the length of the tamping, the amount of the explosive used remaining the same, lessens the danger. The application of this lesson should help in measuring the probable influence of the easy collapse of weak stoppings in checking a mine explosion.

STRONGLY BUILT STOPPINGS THROTTLE EXPLOSIONS

In view of the above it can be said that the presence of strongly built stoppings, capable of resisting the pressure of the initial blast, tends to help in throttling the explosion at its point of origin, and that the release of pressure by the destruction of weak stoppings by the force of an incipient explosion and the consequent easier projection of the heated gases, may be of material assistance in spreading the explosion throughout the mine.

I think it can be safely stated that the subsidence of the explosion in Mr. Affelder's mine was not due to the collapse of the stoppings, but was brought about by other causes not observed by him.

This from W. H. Noone, P. O. Box 5, Thomas, W. Va. He contends that all stoppings should be strongly built of mine refuse faced with concrete.

THE Coal Mining Institute of America, held recently in Pittsburgh, discussed the resistless stopping in reference to limiting the force and area of an explosion. It appears that the history of mine explosions attests that there have been no absolutely indestructible stoppings built, and that neither a wood nor other resistless stopping has the capacity of confining an explosion to the area of its origin. Personally, I believe in good stoppings—as nearly indestructible as possible.

I would not like to assume that we are faced by the alternative of either having men asphyxiated by reason of a number of stoppings being blown down or having them killed outright because the stoppings were too strong to afford the explosion an opportunity to lose force by expansion. The answer of the Mining Institute of America was both "yes" and "no," which is no answer.

F. W. Cunningham's plan to have a strong center wall with rock piled to the roof on either side appears to be a good one and such a stopping should be capable of withstanding the force of an explosion.

Wood stoppings are not to be recommended in a mine where the coal is gaseous or highly inflammable. Neither are wood stoppings any longer economical on account of the high cost of lumber. The most practical and economical stoppings are built with the rock and refuse of your mine, assuming that it makes plenty

of this material. Start your wall four, five or six feet thick at the pavement, according to the amount of rock and dirt available, and gradually incline the wall on both sides toward the top.

The outsides of the wall being evenly and substantially built, the inside should be filled with the finer dirt and refuse. The wall should then be given a good coat of concrete to make it practically fireproof and airtight. If you have any dirt left you can pile it clear up to the roof on either side in the manner indicated by Mr. Cunningham. The impurities of the coal, the slate, roof rock and coal from the falls, and the refuse that accumulates on the haulages will furnish enough material for stoppings in almost any mine. It is cheaper to keep haulages clean by filling up the crosscuts than to build stoppings of brick, lumber or other material.

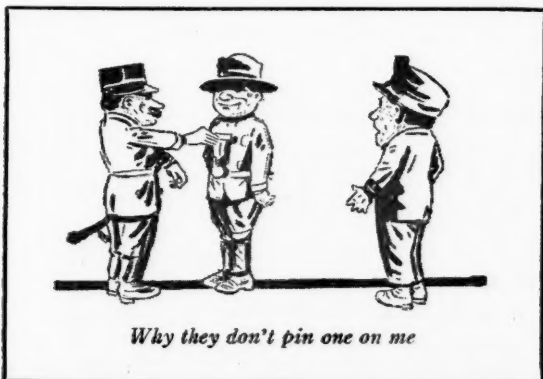
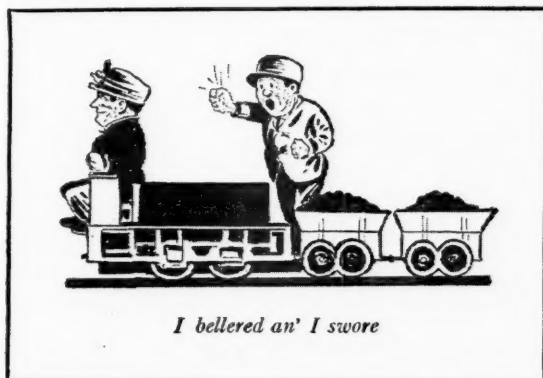
If it is possible to reckon with the phenomena of mine explosions in building our stoppings, we should try and do so; and perhaps many of our readers can give valuable advice on the subject, the result of their experience. In some instances it seems that an explosion will blow down a stopping or two and expend itself in a small area adjacent to the point of origin and thus do but little damage. Another will have force enough to be felt throughout the mine.

Emphasis, of course, must be laid on other conditions that either favor explosions, or develop the mine's security against them. It must be remembered also that stoppings are fundamentally a part of the ventilating system, and they should be made sufficiently permanent and tight to assure satisfactory ventilation.

The Patrioteer

Written expressly for Coal Age

By RUFUS T. STROHM



I've bin readin' in the papers how the boys that's over there
Hev bin fightin' like the devil on the land an' in the air;
Every day some airplane feller does a little flyin' roun'
An' to keep himself in practice brings a dozen Taubes down;
Er some Sammy single-handed raids a piece of German trench
An' they both git hero's medals from the pleased, admirin' French.
They deserve the praise they're gittin', but it seems to me, by gum,
That the world is quite fergittin' all us heroes here to hum.

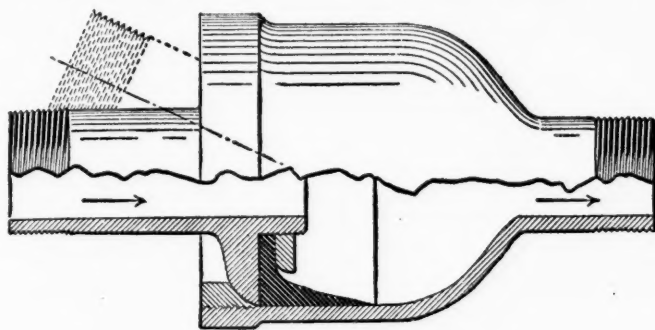
Turn your eyes on me, fer instance, cast yer optics on my chest,
An' you won't find any medals dingle-danglin' on my breast;
Yet in bein' patriotic an' in service that I've done
I don't reckon that there's any that can beat me, barrin' none.
For when winter took the country in his big an' frosty hand,
An' a mighty yell fer fuel echoed up an' down the land,
Then I turned my whole attention to the workin' of a mine
That had not been doin' nothin' since the days of 'ninety-nine.

Now, the stuff was full of sulphur, there was lumps of slate and bone,
There was rock an' dirt in pieces, there was chunks of gob an' stone;
But a bit of it was shiny, an' the most of it was black,
So I sold it free an' gladly, never holdin' nothin' back;
Fer the cries of freezin' millions sorter tetchd my tender soul,
An' I did my best to warm 'em with my cars an' cars of coal;
So I driv an' urged the miners, an' I bellered an' I swore,
An' I bullied 'em an' bribed 'em so they'd dig a little more.

Nights I hardly tetchd a pillow, days I scarcely stopped to eat,
All fer fear the shiv'rin' people wouldn't git sufficient heat;
But when springtime come cavortin' puttin' winter on the trot,
Did they shower me with praises an' with blessings? They did NOT!
'Stid of that, they damned me plenty, up the hill an' down the dale,
An' they said I was a traitor an' I'd ought to be in jail—
Me, that slaved to give 'em fuel! So, I say, it's hard to see,
When they're handin' out their medals, why they don't pin one on me.

end of another joint in the line, as shown in the illustration.

This ball-joint fitting is known as the Berry flexible joint, and where it is inserted an angle may readily be formed in the line. It will act also as an expansion joint, since the ball fits into the cup in such a way that it is free to move backward and forward, thus taking up the variations in the length of the pipe due to



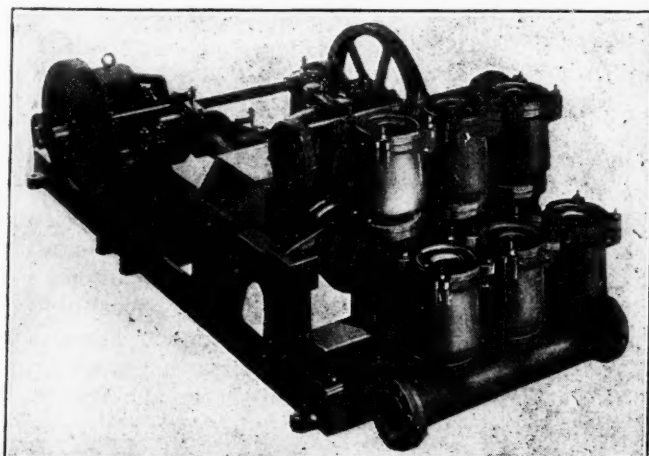
HALF SECTION OF JOINT

temperature. The flexibility of the joint allows it to absorb vibrations satisfactorily and thus saves the line from damage from this source. The device is manufactured by the Iron Clad Joint Co., of New Orleans, Louisiana.

Germans believe the citizen exists for the state, while Americans insist that the state lives for the citizen. Buy a LIBERTY BOND and preserve the American view.

A New Mine Pump

The accompanying photograph shows a new pump which the Harris Pump and Supply Co., of Pittsburgh, Penn., has recently completed and placed on the market. It is a horizontal wood-lined station pump, ranging in size from 300 to 500 g.p.m. The pump is heavily built for severe mine pumping conditions. The pump is of the pot-valve type, with the water end made up of 12



separate pieces, all parts coming in contact with the water being protected by wood lining, except the valve pot covers, which are coated on the inside with lead, and the plungers, which are made to suit local conditions.

A new patented valve of the hidden reinforced type is being used. This, by its construction, affords the max

imum free area through the seat for a given port area, with a consequent lower water velocity through the valves. This greatly lengthens the life of the seats and valves and gives much less trouble from clogging by dirt.

All parts of this pump are interchangeable. Pumps of this design are now running and giving excellent service.

Unless we lend the Government voluntarily by investing in LIBERTY BONDS, the Government will be forced to conscript our wealth.

Inclosed Float Switch for Automatic Control of Pumps

Some of the first float switches were doubtless used in connection with sump pumps in basements of buildings. Present-day uses of these switches, however, cover a wide field of manufacturing and industrial applications.

As an improvement on the open type of float switch, the Cutler-Hammer Co., of Milwaukee, Wis., is now



THE FLOAT AND SWITCH

manufacturing a new inclosed switch which is built to stand hard usage and has a switching mechanism that is positive in its operation. The opening and closing of the switch blades is accomplished by the rise and fall of a heavy copper float, which by means of a rod and lever drives a roller, against the action of a spring, over the point of a cam. This opens and closes the switch with a quick action.

This switch will not get out of step, which is the chief objection to some devices of this kind. The upper part of the switch carries all the operating mechanism and is also provided with mounting lugs. They are made for several different methods of mounting. The inclosing tank can be removed easily for inspection or making connections. The upper casting is provided with an opening and bushing for the entrance of conduit.

These switches are made with one, two, three and four poles. The single-pole switches are intended for use with self-starters for automatically controlling direct- or alternating-current motors. The two-, three- and four-pole switches are intended for use with single and polyphase motors which may be thrown directly on the line when starting.

India Has Some Deep Shafts

According to G. George, who delivered a paper before the Mining and Geological Institute of India, there are three collieries in India with shafts 1000 ft. deep. At one colliery shafts 1200 ft. deep are being sunk and at another the shafts will be 1500 ft. deep. A colliery is planned with shafts as deep as 1800 feet.



More New Prices

New coal prices, effective Mar. 29, were announced by the Fuel Administration last week as follows:

State or Field	Run-of-Mine	Prepared Sizes	Slack or Screenings
Arkansas—(see Note 1):			
Johnson, Franklin and Sebastian, except the Excelsior district.....	\$3.70	\$4.60	\$2.40
Logan and Scott Counties and the Excelsior district of Sebastian County..	4.35	5.15	2.60
Oklahoma—(see Note 1):			
Leflore, Haskell, Okmulgee, Tulsa, Rogers and Coal Counties and the Hartshorn-Wilburton vein in Pittsburg and Latimer Counties.....	3.70	4.60	2.40
McAlister vein in Pittsburg and Latimer Counties.....	4.25	5.10	3.00
Washington:			
Screened Coal (sub-bituminous):	3.55	3.95	2.50
Kittitas County.....		(See Note 2)	
Screened Coal (bituminous):		3.95	1.25
Lewis and Thurston Counties.....	2.75	(See Note 3)	
Washed Coal (bituminous):		4.00	
Kittitas County.....		6.00	2.50
Pierce, King, Lewis and Skagit Counties..		(See Note 4)	
Washed Coal (sub-bituminous):		5.00	1.50
King County.....		(See Note 5)	
Lewis County.....		3.95	1.25
		(See Note 6)	

Note 1.—Summer reductions must be made in prices on all grades, except slack as follows: March, 75c.; April, 60c.; May, 45c.; June, 30c.; July, 15c.

Note 2.—Special steam and gas, \$3.25.

Note 3.—Lump nut, \$3.25; nut, \$3.

Note 4.—Mixed steam, \$5.25; straight steam and gas, \$4.80.

Note 5.—Pea, \$3.50; buckwheat, \$3.25.

Note 6.—Nut, \$3.75; pea, \$3; buckwheat, \$1.50.

The following prices are effective as of Apr. 1:

State and Field	Run-of-Mine	Prepared Sizes	Slack or Screenings
New Mexico (See Note):			
Raton District.....	\$2.35	\$3.25	\$1.65
Gallup.....	3.05	4.05	2.00
Carthage.....	4.25	5.05	3.55
Cerrillos.....	4.05	4.55	3.55
Sugarite and Monero.....	3.00	4.00	2.00

Note.—Summer reductions: April, 50c.; May, 40c.; June, 30c.; July, 20c.; Aug., 10c.

All operators who have complied with the Washington wage agreement are authorized to add 45c. per ton to the foregoing prices.

Coke Prices Fixed to July 1

Coke prices fixed by the War Industries Board will continue in effect until July 1. All matters of price now are being handled by the new Price Fixing Committee of the War Industries Board. The announcement as to coke prices was made in connection with that relating to the Price Fixing Committee of the War Industries Board ment reads as follows:

"The President has approved the recommendation of the Price Fixing Committee of the War Industries Board that the maximum prices heretofore fixed by the President upon the recommendation of the Board, upon ore,

coke, steel and steel products, subject to revision on Apr. 1, 1918, be continued in effect until July 1, 1918; from Apr. 1 to July 1; however, the maximum price of basic pig iron be reduced from \$33 to \$32 per gross ton, and that the maximum price of scrap steel be reduced from \$30 to \$29 per gross ton. No new contracts calling for delivery of any of said commodities or articles on or after July 1, 1918, are to specify a price unless coupled with a clause making the price subject to revision by any authorized United States Government agency, so that all deliveries after that date shall not exceed the maximum price then in force, although ordered or contracted for in the meantime. It is expected that all manufacturers and producers will observe the maximum prices now fixed."

Buy a LIBERTY BOND. Everybody is doing it.

Warns Public To Buy Early

No chance exists for a misunderstanding of the attitude of the Fuel Administration this year in the matter of early purchase and storage of coal by domestic consumers. In a formal statement given out Monday by Dr. Harry A. Garfield, the Fuel Administrator, he said: "The great storage capacity of the country lies in the bins of the individual consumer and there the country's coal reserve must be built up during the spring and summer when coal production is unhindered and the transportation facilities of the country operating at their highest efficiency."

He sounds a warning, however, against overstocking: "Every ton of coal that is hoarded against future needs and is not used during the winter is actual waste. The labor and transportation used to bring the coal to the consumer and the actual energy of the coal itself are withheld from doing their part toward speedy victory. Consumers should secure just a little less coal than they believe they need and should make every shovelful give its full value in heat and power. Every shovelful saved means help for the industries in turning out supplies for our troops abroad, help for the ships that must bridge the 3000-mile gap between our shores and the battle-front, and help toward ultimate victory."

The Fuel Administration is even going so far in the matter of securing early buying as to make this offer: "The Fuel Administration will cooperate with all communities in an effort to provide storage for emergency stocks of coal to be set aside during the spring and summer to meet emergencies of weather and transportation which may arise next winter."

Increased Freight Rates on Anthracite

The order providing for an increase of 15c. per ton in the railroad rates on anthracite coal in official classification territory, with the limitations provided, reads as follows:

It is ordered that the order of Mar. 12, 1918, entered in this proceeding authorizing certain increases in rates on anthracite coal between points in official classification territory named in the suspended schedules, be, and it is hereby, modified in the fifth paragraph thereof to read as follows:

It is further ordered that the commodity rates on anthracite coal, contained in the schedules under suspension in this proceeding, in so far as increased by 15c. per long ton, or less, as stated in said schedules, be, and they are hereby, approved; provided that such rates between points in official classification territory shall not be increased by more than 15c. per long ton. Provided further, that where a through rate between two such points in the United States is made by combination, appropriate provision is made in the schedules that the aggregate increase of the factors applicable in such combination shall not exceed 15c. per long ton; provided further, that where through rates from points in official classification territory in the United States to Canadian destinations are made by combination the factors applicable to the Canadian frontier used in such combinations may be increased by not more than 15c. per long ton, which increase shall accrue to carriers within the United States.

Higher Price for Clean Coal

Twenty cents a ton may be added to the Government coal price by operators who use special means for eliminating impurities. A permit, however, must be obtained from the legal department of the Fuel Administration before the addition may be made. Coal which has been specially cleaned will be designated by cards buried in the coal at the time of loading and by notations on the invoice. The initial permits are to expire July 31, but in cases where operators have complied carefully with the regulations they will be extended.

Interstate Commerce Commission Retracts Statement Made on Previous Opinion

The Interstate Commerce Commission took unusual action last week when it withdrew certain statements reflecting on the Delaware, Lackawanna & Western Coal Co. and the Delaware, Lackawanna & Western Railroad Co. The statement made in the previous opinion is as follows:

"The record shows that when the shipments in question moved the complainant was, and that it still is, a subsidiary of the defendant, and that the defendant has endeavored in various ways, both lawful and unlawful, to give preference and advantages to the complainant. The payment of freight charges by the complainant to the defendant seems to have been largely the transfer of money from one pocket to another. The fact, however, does not simplify or aid the complainant's demand for an order of reparation. Moreover, an award of damages in the present proceeding, from some

points of view, would simply be an extension, under our authority and with our approval, of the practices condemned in the Anthracite Case."

In retracting the foregoing statement, the Commission now says:

"That language was based largely on the facts before us in the Anthracite Case, 35 I. C. C., 702, the record in which was referred to and made a part of the record in this proceeding. The history both of the past and present relationship between the coal company and the railroad company was fully developed on the rehearing, and it was made clear that the language in question, in so far as it concerns this relationship, must be withdrawn as not being justified by the conditions existing at the time the report was written."

Weekly Production Statistics

Bituminous coal production for the week ended Mar. 23 was 10,972,000 tons, or a little gain over the week preceding, when there was a decided falling off. Anthracite shipments showed a gain of over 200 carloads, or 42,487 cars for the week. Beehive coke production continues to make a good showing, the week's figures having been 635,000 tons. Byproduct-coke ovens are working at 88 per cent. of full-time capacity and produced during the week under review 464,264 tons.

Brief Washington Notes

J. A. Galligan, of Chicago, and James A. Ballard, of Detroit, have been named district coke representatives of the Fuel Administration in the territory contingent to their respective cities.

Pending the preparation of forms for permits and applications, retailers may add to their selling price allowances made to operators for special preparation of coal. In granting this permission, however, the Fuel Administration orders all retailers to keep an accurate record covering all purchases and sales of specially prepared coal as reports on these purchases will be required later.

Coming Meetings

AMERICAN ASSOCIATION OF ENGINEERS will hold its fourth annual convention May 14 in Chicago, Ill. Secretary, A. H. Krom, 29 South La Salle St., Chicago, Ill.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS' annual convention June 26-28 at Atlantic City, N. J. Secretary, F. L. Hutchinson, 29 W. 39th St., New York City.

AMERICAN INSTITUTE OF MECHANICAL ENGINEERS will hold its spring meeting June 4-7, at Worcester, Mass. Secretary, Calvin W. Rice, 29 West 39th St., New York City.

MICHIGAN-OHIO-INDIANA COAL ASSOCIATION will hold its annual convention Apr. 10 and 11, at Cincinnati, Ohio, with headquarters at the Hotel Sinton. Secretary, B. F. Nigh, Brunson Building, Columbus, Ohio.

INDIANA RETAIL COAL MERCHANTS ASSOCIATION will hold its spring meeting Apr. 10 and 11, at the Hotel Severin, Indianapolis, Ind. The meeting will be a strictly business affair, most of the time being given to discussion of retailers' problems. Secretary, R. R. Yeagley, 703 Fidelity Trust Building, Indianapolis, Ind.

THE LABOR SITUATION

EDITED BY R. DAWSON HALL

General Labor Review

The decision of the National Board of Labor as to the principles and policies which will govern its action in dealing with employers and employees for the duration of the war was announced on Mar. 29. It has an important bearing on the decision in cases like that of the Hitchman Coal and Coke Co. Under the head of right to organize, the declaration of principles says:

"1. The right of workers to organize in trade unions and to bargain collectively, through chosen representatives, is recognized and affirmed. This right shall not be denied, abridged or interfered with by the employers in any manner whatsoever. 2. The right of employers to organize in associations of groups and to bargain collectively, through chosen representatives, is recognized and affirmed. This right shall not be denied, abridged or interfered with by the workers in any manner whatsoever. 3. Employers should not discharge workers for membership in trade unions, nor for legitimate trade-union activities. 4. The workers, in the exercise of their right to organize, shall not use coercive measures of any kind to induce persons to join their organizations, nor to induce employers to bargain or deal therewith."

OPEN SHOP NOT TO BE DEEMED A GRIEVANCE

In reference to the present state of unionism its principles are thus defined:

"1. In establishments where the union shop exists the same shall continue and the union standards as to wages, hours of labor and other conditions of employment shall be maintained. 2. In establishments where union and non-union men and women now work together, and the employer meets only with employees or representatives engaged in said establishments, the continuance of such condition shall not be deemed a grievance. This declaration, however, is not intended in any manner to deny the right, or discourage the practice of the formation of labor unions, or the joining of the same by the workers in said establishments, as guaranteed in the last paragraph, nor to prevent the War Labor Board from urging, or any umpire from granting, under the machinery herein provided, improvement of their situation in the matter of wages, hours of labor, or other conditions, as shall be found desirable from time to time. 3. Established safe-guards and regulations for the protection of the health and safety of workers shall not be relaxed."

WOMEN AT MAN'S WORK TO GET AS MUCH AS MEN

Other rulings are as follows:

"If it shall become necessary to employ women on work ordinarily performed by men, they must be allowed equal pay for equal work and must not be allotted tasks disproportionate to their strength.

"The basic eight-hour day is recognized as applying in all cases in which existing law requires it. In all other cases the question of hours of labor shall be settled with due regard to governmental necessities and the welfare, health and proper comfort of the workers.

"The maximum production of all war industries should be maintained and methods of work and operation on the part of employers or workers which operate to delay or limit production, or which have a tendency to artificially increase the cost thereof, should be discouraged.

"For the purpose of mobilizing the labor supply with a view to its rapid and effective distribution, a permanent list of the number of skilled and other workers available in different parts of the nation shall be kept on file by the Department of Labor, the information to be constantly

furnished: 1. By the trade unions; 2. By state employment bureaus and federal agencies of like character; 3. By the managers and operators of industrial establishments throughout the country. These agencies should be given opportunity to aid in the distribution of labor, as necessity demands.

"In fixing wages, hours and conditions of labor regard should always be had to the labor standards, wage scales and other conditions, prevailing in the localities affected.

"1. The right of all workers, including common laborers, to a living wage is hereby declared. 2. In fixing wages, minimum rates of pay shall be established which will insure the subsistence of the worker and his family in health and reasonable comfort."

ANTHRACITE MINE WORKERS ARE INDUSTRIOUS

In the anthracite region, no developments have taken place regarding the threatened secession. The union is a badly threatened organization, but it contrives, with all its buffetings, to be reasonably seaworthy and to find place for new deckloads of passengers at nearly every port of call.

The operators and fuel administrators in the anthracite region have been desirous of keeping the mines steadily at work during the Holy Week and Easter season. The leaders of the mine workers agreed that Maundy Thursday, Good Friday and Holy Saturday should not be kept as holidays. They appear to have been entirely successful in enabling the mines to run, though some of the mines were somewhat short-handed. Good Friday has been a holiday for years hitherto, the men preferring not to work on that day.

But Easter Monday was also Apr. 1, the day set apart by the union for celebrating the inauguration of the 8-hour day in the bituminous region. Its religious and secular importance and the need the union had to present its case in favor of the increased dues made the union leaders persistent in advocating its observance. The mine workers too were somewhat tired and stale with their long grind.

The difficulty about the men imported by the Lehigh Coal and Navigation Co. into the Panther Creek district has been settled. These men were said to be evading military service and were charged with spreading pro-German sentiment. Some of them were said to be Austrians. A general tie-up of the mines of the Navigation Company was threatened, but President Kennedy, of the Seventh union district, tried hard to straighten matters out. John J. Casey, of Wilkes-Barre, a representative of the United States Department of Labor, investigated the matter and reported in favor of the employment of the men. The Navigation Company is importing men in large numbers for work at its mines.

CITIZENSHIP IS AN HONOR TO BE SOUGHT

The mine workers in Columbiana County, in the north-eastern edge of the coal fields of Ohio, are compelling the foreign miners to become naturalized or forfeit membership in the union. One wonders what good are citizens who enter their citizenship by compulsion and not by preference. Citizenship is an honor to be sought, not a punishment to be inflicted. The Ohio mine workers in their state convention in Columbus adopted a resolution to compel all alien miners to become United States citizens just as soon as they have been here the required length of time. Those who failed compliance with this rule were to be expelled from the union.

The laws of the United States are framed on the idea that naturalization should be a free act of the individual after he has learned to desire such naturalization. The

country does not seek to put itself under obligation to defend and care for persons who are not American at heart. We have already too many citizens with varying degrees of hyphenation for us to wish to add in any way to their number. The better plan would be for the union to prohibit such men from voting at union meetings until they have taken those steps which will render them capable of voting on national affairs. In the last week of March no less than a dozen Austrian mine workers declared their intention of becoming citizens, the union at West Point having chosen May 1 as the limiting date for those seeking citizenship. Expulsion is threatened for all those who neglected to perform this duty before that date.

Subdistrict No. 5, which is the Eastern Ohio region, has a large service flag 36 ft. long and 12 ft. wide. It bears 1000 stars, the union having that number of men in the service.

THE VIRGINIAS, HITHERTO QUIET, HAVE TROUBLES

In some of the counties of West Virginia adjoining Kanawha County foreign propagandists have been particularly bold and active within the last few weeks. Most of the agitators are believed to be members of the Industrial Workers of the World. One of the propagandists is a Greek who has been attempting to foment trouble among Greek miners. Governor Cornwell has been investigating the activities of these trouble-makers and has made it plain that any man trying to cause industrial disturbance will be severely dealt with.

In Horse Creek, Boone County, West Virginia, a strike at the coal mines has been in progress for two weeks. It is the outgrowth of an attempt to organize the mine workers. As far as can be learned some of the men do not wish to join the union, but those that do belong are believers in "benevolent assimilation" and desire to compel them to come in.

Just over the West Virginia line in the Clinch Valley the United Mine Workers have men at work in Big Creek and Coal Creek organizing the men at the mines of the smaller corporations. In Big Creek they have been successful but in Coal Creek no organization has as yet been started.

SOME PERSONS TRULY BODE NO GOOD TO ANYONE

No new developments have taken place in the Colorado split. The Seattle Union Record well compares John R. Lawson's career with that of William D. Haywood. Both were charged with murder, Haywood being alleged to have killed the former governor of Idaho. Labor spent large sums of money to free them both, the Haywood defense being paid for by the American Federation of Labor. Both men were freed and both when freed threw in their fortunes with hostile organizations. The moral is quite plain though the Union Record does not appear to draw it. The union must be careful to give its allegiance and support to men of safe and sane principles of action, men who can be depended on to be fair in their judgments in regard to all men. Often the union is not conservative enough in its choice of men and the trouble they cause to capital is but a foretaste of the trouble they will later cause to the labor organization to which they temporarily belong.

There is an agitation at Alberta, Canada, against alien enemies, just as there is in the United States. The miners feel that citizens should be granted consideration first. On Mar. 27 Premier Stewart practically assured a deputation from the United Mine Workers at Edmonton that the provincial government would take a census of the mine workers so as to determine how many of them were alien enemies.

About 60 per cent. of the mine workers are said to be of foreign birth, mostly Italians, Austrians and Russians. Not more than half of these men are of alien enemy nationality and nearly all of them are naturalized citizens. But the naturalization does not confer any miraculous regeneration of heart and will. Canada, like the United States, has too many half-baked citizens and perhaps would be less badly hampered if they could be classi-

fied unqualifiedly as alien enemies. Had naturalization been attained at greater trouble and been urged less insistently the possession of citizenship would have been a surer guarantee of that change of viewpoint which the acquisition of naturalization papers is supposed to evidence. As with the penitents at the mourner's bench, the work of regeneration is so incomplete that after a few weeks it needs to be done all over again.

In the Glace Bay district of Nova Scotia the difficulty is about the threatened introduction of Chinamen. Robert Baxter, vice president of the Amalgamated Mine Workers, and James B. McLachlan, the secretary of the same organization, held a meeting of the mine workers employed by the Dominion Coal Co. on Mar. 24, and both spoke against the immigration of coolies. Meantime, Silby Barrett, president of their organization, and George Varbin, of the Phalen local, are in Newfoundland. They expect to stay a month and to recruit 1000 men to work in the Glace Bay mines. The work is being undertaken for the government through orders issued by Fuel Controller Magrath who followed a suggestion made by the executive board of the Amalgamated Mine Workers.

NOVA SCOTIA STEEL CO. MAY HAVE BIG STRIKE

The mine and steel workers of the Nova Scotia Steel and Coal Co. have been talking strike. They want an extra dollar per day so that their wage will be equal to that paid to the employees of the Dominion Coal Co. There are about 3000 men involved. By law they are allowed one day of idleness to consider whether they will call a strike. If they decide in favor of it they have to work 30 days before they can start their strike. Meanwhile an attempt will be made to settle the dispute by negotiation.

A meeting is to be held April 3 and then the question will be voted on by all the men. The boys in the Amalgamated Mine Workers of Nova Scotia are not allowed a vote.

The papers in Nova Scotia, as elsewhere, have been full of the repulse of the British and French armies in France. Many of the mine workers of the Nova Scotia Steel and Coal Co. believe that there has been no truth in the story. They think that the repulse has been faked by the corporation, and the story thus evolved has been spread on the pages of the local papers at the expense of the Nova Scotia Steel in order to convince the men that the cause of the Allies is desperate and strikes cannot be permitted.

Which is the greater pain—to part with a few dollars for a LIBERTY BOND, or suffer the wounds of battle? The boys at the front are doing their share. Are you?

Patriotism in Illinois Mines

Illinois mine workers do nothing by halves. Their loyalty seemed at a low ebb when the war started. Now it is at such a high tide that it sets the nation wondering. The other day 110 mine workers employed by the Royal Mining Co., at Belleville, St. Clair County, held an impromptu meeting at the head of the shaft and adopted a resolution that every man subscribe for at least one Liberty Bond of the third issue before going to work. The mine workers' union at Panama, Montgomery County, has voted to donate one per cent. of the wages of its members to war funds for two months. The gift will aggregate between \$1400 and \$1500.

But some of the patriotism is perhaps ill-advised. At the Peoria biennial convention the mine workers adopted a resolution that they would not work in any mine if the Stars and Stripes did not wave over it. Of course, the operators did not show any disinclination to unfurl the flag, even though they probably prefer not to have complicity forced on them. If an operator can be compelled by his mine workers to erect a flag under penalty of a strike, why should not a mine worker be compelled by the operator for whom he works to pin a flag on his working jacket under penalty of discharge?

It is said that this resolution of the mine workers was not so generally circulated that the operators all became cognizant of it. As a result, at several mines when the men came to work there was no flag flying. Thus it was that during the past week there were flag strikes at the Muren mine of the Southern Coal, Coke and Mining Co. and the Eldnar Mine of the Eldnar Coal Co., near Belleville. The mine workers of the Muren mine declare that they repeatedly requested the Southern Coal, Coke and Mining Co. to comply with the resolution. That corporation had made arrangements for the erection of a flag pole, but there was unavoidable delay. After a 40 ft. pole had been erected and a 4 x 6-ft. flag unfurled the men returned to work. They are subject to fines under the automatic penalty clause. The flag is also flying at the Eldnar mine and the men are back to work.

I'm buying LIBERTY BONDS because if I did not buy them and other Americans followed suit, this country would deserve to get everything the Kaiser chose to hand it.

Engineers Discuss Labor Problem—I

The New York section of the American Institute of Mining Engineers held a notable meeting Mar. 26 in the Engineers' Club for the discussion of labor and employment problems.

Sidney J. Jennings, vice president of the United States Smelting, Refining and Mining Co. and president of the Institute, traced the origin of his company from its inception to the present time. He said that its fundamental idea from the time when the shares were issued was one of cooperation and then analyzing the present relation of the company to industry added that if the company were not fulfilling its proper function it might have to be abolished. He found three dangers besetting the proper operation of the modern company. First, the capitalist may become divorced from a sense of personal responsibility in the operation of the business. Second, the actual manager or management may have considerable power without having any capital interest in the concern, and third, the laborer or worker may feel that he is only a cog in the big wheel.

PARTNERSHIP, PROFIT SHARING, INTERMEDIATION

Mr. Jennings suggested the following methods for overcoming this feeling of the laborer that he is only a cog in the machine. He cited the fact that the United States Steel Corporation offers actual partnership through the purchase of shares in the corporation. Second, he thought that profit sharing above a fair return was one of the best means of making the company a truly cooperative agent. Third, he felt that the employment of a central employment manager was almost essential to the maintenance of harmonious relations between the company and the workers. He felt that a good employment manager could be responsible for either the good-will or the ill-will of employees which in turn would mean success or failure of the institution.

Walter Douglas, of the Phelps Dodge Corporation, operating copper mines in Arizona, said that it was becoming increasingly difficult to get the viewpoint of the wage earners due to the increasing numbers of men employed by individual companies. He contrasted former conditions when the employer or the manager or the shift boss had so few working under him that he knew them all personally and could get their viewpoints very readily, with present conditions where concerns have thousands and tens of thousands of men in their employ without the possibility of knowing them all personally or getting their point of view.

He thought that some substitute must be found to bring about the close personal touch which formerly existed in the small companies. He spoke of the necessity of getting specialists to analyze the labor problems for companies and thought that engineers should be the first to seek the aid of such specialists because the engineers were accustomed

to employing special men for special problems. He thought that the manager of a concern is not suited to this particular kind of work and yet he is the one who most frequently tries to solve the problem.

Mr. Douglas believed that the solution will be found in some intermediary between the employer and the employee, and stated that the union has not as yet filled this function satisfactorily. He was quite certain that the big problem in the labor situation is not one of wages or hospital dues, but rather of the thousands of little things that the company knows nothing about until a crisis comes. It would be the duty of an intermediary to know what these things are and to correct evils before they develop into crises.

FOR INTERMEDIATION CHOOSE LABOR LEADERS

The type of man best able to deal with labor would be one who has been a leader of labor himself and he cited Secretary Wilson and John Mitchell as types who would be good intermediaries for large concerns. Speaking for the Phelps Dodge Corporation, he said that they had an employment agent at the Copper Queen whose duty it was to employ, transfer and dismiss all workers. The foreman of any department could not dismiss a man but was obliged to inform the employment manager that the man was not suitable for that particular work, whereupon the employment manager would transfer him to some more suitable place.

The company has a pension system for those who have worked for the company for 15 years. The pension is 2 per cent. of the salary for each year worked, the maximum granted being \$1000 per annum. The company also operates a benefit association to which 80 per cent. of the employees belong, to the funds of which the company contributes about an equal amount with the employees.

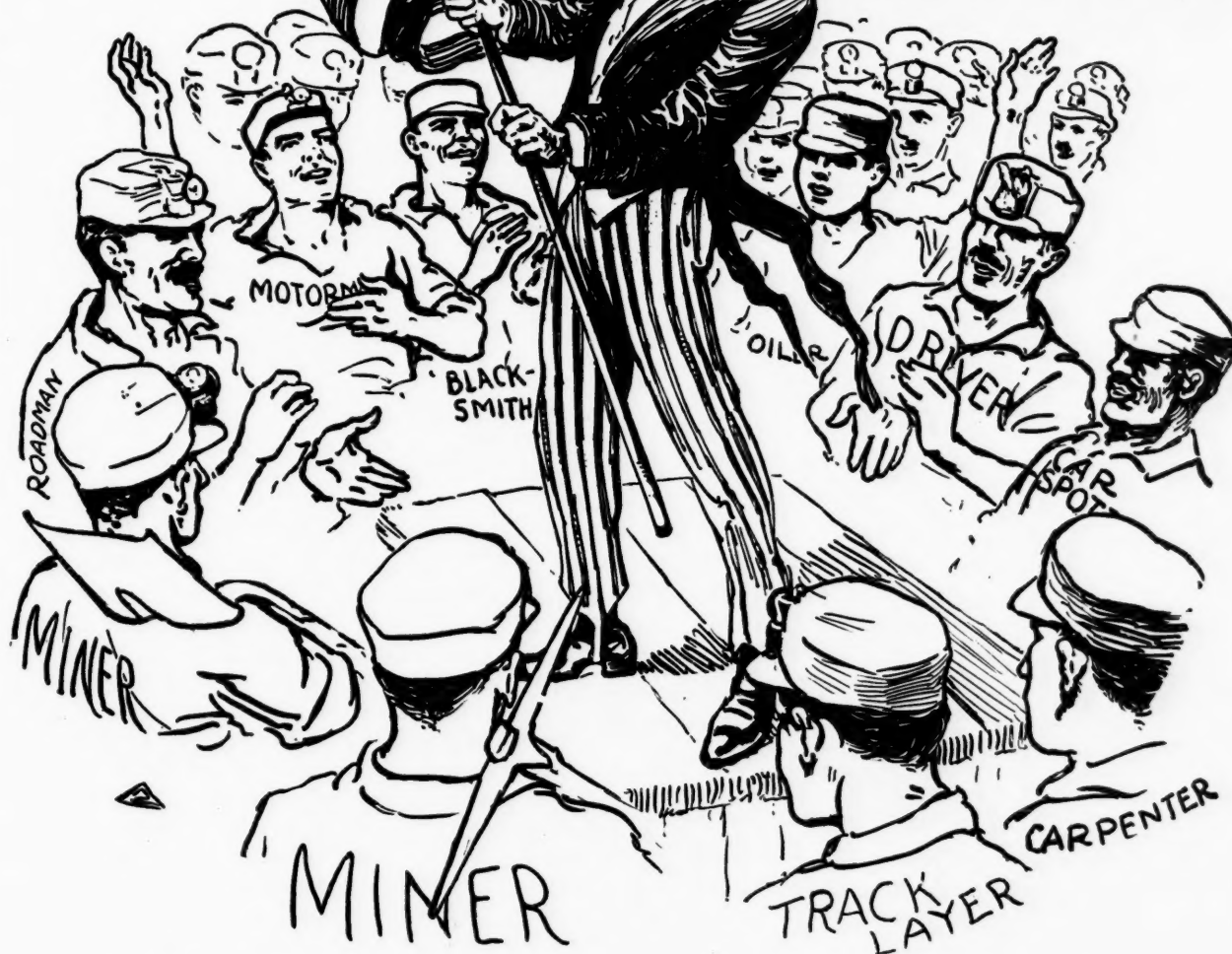
This past year an experiment was made in offering a flat service bonus of \$100 to every man who had worked for the company one year. This was offered without regard to his position or salary and was a straight premium for sticking to the job.

(To be continued)



KULTUR

Rally Round the Flag And Buy **LIBERTY LOAN BONDS**



BY buying Liberty Bonds in large quantities, the mine workers are showing their patriotism and demonstrating that till the war is over those at home live only to support their sons and brothers in the blood-stained trenches and battlefields of France.

EDITORIALS

Why Not "Refine" Coal?

MANY materials that are used or may be used in a raw state are much more valuable and efficient if "refined" or otherwise "treated" before being finally consumed. Raw wheat, in the form of grain, is edible and life-sustaining, but it is certainly much more palatable and more efficient as a food for man if made into bread. And yet we know not for how many centuries wheat and other grains were eaten raw or at best only parched or boiled before man learned the art of making even the crudest of bread.

It took man a long time to learn how to "refine" from the crude brown, black or amber-colored earth-oil, the colorless gasoline that now drives his automobiles. From the financial standpoint crude petroleum is worth only a few cents per gallon; industrially it is worth its equivalent heat content in wood, coal or any other raw fuel, due allowance being made for ease of firing and the absence or practical absence of ash. In the refined state petroleum is worth several cents per gallon; while from the utilitarian standpoint it is worth vastly more than its equivalent heat in coal or wood. When refined, petroleum may be put to uses for which solid fuels can not be employed at all. In other words, the economic utility of petroleum has been expanded many times by the refining of the raw material, by splitting it up into many products highly useful in ministering to the convenience and the necessity of man.

The Bureau of Mines has recently published Bulletin 135, entitled "Combustion of Coal and Design of Furnaces," by Henry Kreisinger, C. E. Augustine and F. K. Ovitiz. After describing what was perhaps the most thorough and elaborate series of tests on the burning of coal ever undertaken, the authors draw among others the following conclusions:

The volatile matter of bituminous coal would have greater economic value if converted into gas or liquid fuel than if burned under steam boilers. Under present market conditions heat in the form of coal gas brings 8 to 16 times the price of an equivalent amount of heat in the form of coal. Gas is an extremely convenient fuel and can be used to advantage for many purposes such as cooking, lighting and heating buildings, municipal lighting, and in some industrial plants for obtaining a uniformly high temperature and clean products of combustion. The residue from the coking coals should find a ready market for house-heating and steaming purposes. As both the gas and coke burn without smoke, their separate use would tend to make cities cleaner. The manufacture of gas from coal has been a commercial undertaking for many years and is still rapidly developing, the liberal margin between the price of heat in the form of gas and the price of heat in the form of soft coal making the conversion profitable.

The conversion of the volatile matter of bituminous coal into liquid fuel seems to be even more promising than its conversion into gas. By the application of proper processes it seems possible to reduce a large part of the volatile matter to liquid, of which an appreciable percentage can be obtained in the form of light oils suitable for motor fuel. Benzol has been obtained at byproduct plants for many years without any special effort to produce it. There is no

doubt that with well-developed methods the yield of benzol and similar oils could be greatly increased.

Why is not bituminous coal capable of as thorough a refining as is petroleum? The products of coal distillation are many, embracing solids, liquids and gases. Of these the chief solid is of course coke. This can be easily, efficiently and smokelessly burned. The other chief product of coking is gas. This forms almost an ideal fuel for domestic and house-heating purposes. Between these two extremes lie a myriad of useful substances merging from explosives to fertilizers and gasoline or its equivalent.

Heretofore the great problem of byproduct coking has been the commercial utilization of the gas. So great is the volume of gas evolved in the coking process and so large a portion of the heat contained in the original coal does it carry that its utilization has so far been confined almost exclusively to large industrial plants such as the steel mills or to a few centers of dense population such as the larger cities.

The domestic uses of coal are now confined almost exclusively to cooking and house heating. For both of these coal is dirty, inconvenient, inefficient and wasteful. The quantity of heat utilized in actual cooking as compared to the heat generated by the fuel in the ordinary range is admittedly small. Furthermore, in most cases an appreciable amount of coal is lost through the grates. Even if ash sifting is resorted to, a considerable amount of combustible matter finds its way into the ash can and eventually to the ash disposal dump. The heat thus lost is lost forever.

While it is quite possible to burn coal (and by this is meant bituminous coal, since it forms by far the greater portion of the domestic fuel of the land) smokelessly in the ordinary kitchen range, such smokeless consumption requires no small degree of skill and is consequently not ordinarily accomplished. There is accordingly a considerable loss in the form of unburned or only partially burned gases passing up the chimney.

Practically all that has been said regarding the kitchen range is equally true of the house-heating furnace. In such furnaces also there are incurred what are known in power plants as "standby losses"; that is, a certain amount of fuel is consumed in merely holding fire over more or less extended periods of time. Thus fires are frequently "banked" at night, or during certain hours of the day and sometimes over week ends or other holidays. Such banking avoids the inconvenience of building a new fire when normal heat is again needed.

Any comparison between the convenience and utility of gas and coal as a domestic or house-heating fuel cannot fail to reveal the advantage of the former. Delivered by pipe to the exact point of application it is merely necessary to open a cock or valve and apply a match to secure full heat. This heat, furthermore, is always under easy and perfect control. The fuel burns readily, smokelessly and may be applied comparatively

efficiently. With gas the dirt and inconvenience of coal are obviated and there is no carting of either fuel or ashes; there is neither loss of combustible through the grates nor standby losses.

It would thus appear that if heat in the form of gas could be furnished domestic consumers at a price even somewhat higher than heat in the form of coal, it would still be economical to use. The many advantages to both individual consumer and the community at large arising from a substitution of gas fuel for coal would render its use economically advantageous even though the price per unit of heat were higher. Under present methods of gas manufacture and the prices at which gas and coal are now sold there can be no such economic substitution, however convenient such a change might be.

It would almost seem that the time is at hand, if it has not indeed arrived, when the byproduct oven can solve the problem of cheap gas for the householder. Surely the coke and other byproducts besides the gas should almost if not quite pay for the original coal and the process of coking. It would be logical to believe also that heat could be delivered through gas mains quite as cheaply as by wagons and trucks over city streets choked with traffic, snow and ice or possibly all three. To burn coal raw is admittedly wasteful: to burn it in the form of gas and coke permits of high economy, the saving of many valuable substances, the enjoyment of great convenience, and might quite possibly go far toward rendering such "coal famines" as the country suffered last winter impossible.

I'm buying LIBERTY BONDS because no decent, honorable man can afford not to buy them.

Names of Coal Beds Are of Little Value

IN THE eastern coal fields of the United States, unless, in the description, the name of the coal bed is coupled with the name of the coal district in which it is found, the value and the character of the coal cannot be determined even approximately.

Undoubtedly there is a lower Kittanning bed somewhere in the anthracite region, but it is doubtless quite like the Freeport bed in the same region, if that could be identified. But both are quite different from the same beds in the bituminous regions, no matter where found. Location has had such an effect on all the beds in the anthracite region that even if we could give the different beds their names according to bituminous nomenclature every one would know at once without being told that the beds differ widely in the anthracite region from what they are in the bituminous region.

But this is true also in large degree in the bituminous region where the continuity of the beds is not a matter of debate, but has been traced without possibility of a peradventure. Here the characters of the beds change materially from place to place, and people having experience in only one section get into the habit of believing that the character of the seam is unchanged all over the bituminous region. As a matter of fact the seams vary so much that they also change their names from place to place.

Thus the lower Kittanning coal where the fuel is found to be of low-volatile character is known as the Miller seam—perhaps we should do better to term it

the Miller coal. Where it has a large percentage of volatile material it loses that distinctive term. The term "Miller" defines an area as much as a bed. It is a regional name first and a seam name second.

For if you would match coals with the Miller, you would find that other coals from the same district, but from another bed, more closely resembled the Miller coal than coals from the same bed in another district. That is why the name does not spread. To use the name "Miller" as a general synonym for lower Kittanning would create such a misapprehension that it would be almost dishonest to attempt to give it such currency. To use it as the name of another bed in the same district would not be so injurious to the public. In some cases the purchaser of the spurious Miller—that is coal not from the lower Kittanning bed—would have a coal of equal or higher thermal value and of greater purity in the matter of ash or sulphur.

The same is true of the Moshannon coal. It is perfectly true that the Moshannon was once regarded as a lower Freeport coal found along the Moshannon creek in the first bituminous coal basin of Pennsylvania. To-day it is found possible to sell as Moshannon not only the lower Freeport coal, but all the coal from all the many beds found near Osceola and Houtzdale, whereas the lower Freeport coal at Du Bois could not be regarded for one moment as Moshannon. For "Moshannon" is a local name to express a local character. The lower Kittanning along the Moshannon creek is more "Moshannon"—if the term be permitted—than the best of lower Freeport would be, say, at Reynoldsville or Punxsutawney where the coal is wonderfully clean, but has so much volatile material that it is regarded primarily as a coking coal.

The Big Seam in the Georges Creek region produces a wonderful smithing coal, not because it is the Pittsburgh seam so much as because it is located close to the great uplift and is therefore liberally mineralized. The coal of the Sewickley seam in Georges Creek—Marylanders term it the Tyson—is much more like the Pittsburgh coal in Georges Creek than it is like the Sewickley coal in Pittsburgh.

These remarks have reference mainly to the percentage of volatile matter, but they are true also as regards purity. The lower Kittanning coal in some few places has an immense amount of sulphur and many partings. In one limited section it seems fitter for a source of sulphur than a source of fuel. In some places it is mined with facility, in others a differential must be paid, for the pick seems to stick in its tenacious surface. The lower Kittanning in the section, where it is called the Miller seam, does not have any of the unfavorable characteristics mentioned.

There is perhaps in the Appalachians one name which specifies the coal fully—Pocahontas. But if the Pocahontas coal were spread over large areas, the same statement could not be made. It may sometime be correlated to some minor bed in the extreme western and north-western Pennsylvania field, but if so the coal would be entirely different in its fuel ratio even though perhaps just as pure as far in its ash and sulphur content.

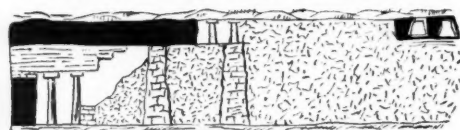
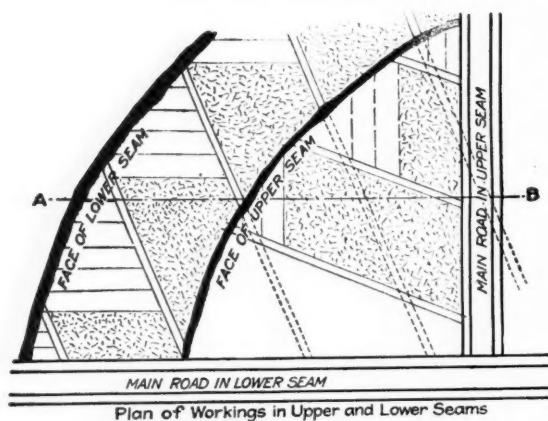
We cannot do as one authority, who should have known better, once did. He made a cross-section of the Pennsylvania coal fields and gave a common analysis for each seam as if such a generalization had any value.

DISCUSSION BY READERS

Working the "Rooster Coal"

Letter No. 4—Kindly permit me to submit my plan for working the No. 8 Pittsburgh seam, together with the overlying "rooster coal." In my experience the best method of working these two seams is to apply the long-wall method of mining, carrying the working face in the lower seam about 100 yd. in advance of that in the upper seam.

In the accompanying figure I have attempted to show the general plan, including the main roads, crossroads and gateroads in the two seams. As there indicated, the diagonal or crossroads in the upper seam are driven



Section on Line A-B

PROPOSED PLAN OF WORKING THE "ROOSTER COAL"

at an angle of about 45 deg. with those in the lower seam. The main roads, in the two seams, are driven in a direction practically at right angles to each other, and the gateroads are driven parallel to them, in each case.

In the lower portion of the figure is shown a cross-section on the line AB. This cross-section is drawn to an exaggerated vertical scale. It shows the working faces in the two seams, that in the lower seam being about 100 yd. in advance of the face in the upper seam.

Work is commenced in the lower seam by driving the main roads through the shaft pillar, at the boundary of which a longwall face is opened out. Crossroads are driven off the main road at an angle of about 70 deg. and at distances of, say 80 to 100 yd. part. The gateroads are driven parallel to the main roads at distances of about 15 yd. apart, center to center.

As shown in the sketch, the coal in the lower seam is taken out beneath the drawslate. A short distance back from the face, however, the drawslate and the mixed slate-and-coal parting separating the two seams

are allowed to fall. The refuse is built up in substantial walls to support the coal in the upper seam. This refuse forms the floor on which the miners stand when working the rooster coal.

When the work in the lower seam has advanced a sufficient distance, the work of taking out the rooster coal is started by ripping the roof on the main roads in the lower seam, at a convenient point for driving an incline to the floor of the upper seam. When this is reached, the main roads are driven in the upper seam and crossroads turned at an angle of about 70 deg. off the main roads.

The work in the upper seam is identical with that just described in the lower seam. As the crossroads in the upper seam all cross those in the lower seam at an angle of about 45 deg., there is less difficulty experienced in maintaining good working conditions while taking out the rooster coal.

In this method of working, great care must be taken to build substantial packwalls and fill up between them with the slate that formed the parting of the two seams. By this means it is possible to make a good floor for working the upper coal. When proper care is taken in performing the work, I believe it is possible to take out 100 per cent. of the coal in each seam. This is the method employed for working the "Red Coal," and the "Ras Las" coal in the Rhymney Valley, South Wales.

Oak Hill, W. Va.

WM. DICKINSON.

American citizens should buy LIBERTY BONDS, because they are the means by which the United States is keeping its faith with the Allies in the war.

Danger and Discipline

Letter No. 2—Much has been said and written about the increasing number of fatal accidents in the mines of this country. It has even been stated that the fatality rate in coal mining has exceeded the tonnage rate.

While numerous inquiries have been started to ascertain the causes of these accidents, the fact still remains that they continue to increase in frequency. John Rose, in his letter, *Coal Age*, Mar. 2, p. 431, has attributed the increase in mine accidents chiefly to the relaxation of mine discipline. He describes in an interesting manner the reasons why operators and miners alike show a less regard for safety rules than ever before.

LARGE INCREASE OF MINE FATALITIES

The report of the Bureau of Mines shows a larger number of fatalities have occurred in the mines, during the past year, than is recorded for any one of the seven previous years. A brief glance at the records of Illinois shows that we have, in this state, contributed our share toward this unnecessary slaughter.

However, while this great loss of life is naturally deplored, it is some consolation to feel that the lives thus sacrificed have blazed a way that may and I hope will lead to a more effectual means of securing greater safety in mining operations.

The high death rate shown in coal-mining reports has impressed on everyone the need of a more strict enforcement of mining laws and a higher regard for human life. In our own state, we have two shining examples of executives who have awakened to a realization of the need of a more active campaign in the interests of mine safety. I am proud to say that these are Governor Frank O. Lowden and Evan D. John, Director of the Department of Mines and Minerals.

Within the past two months these two officials have decreed that the number of fatal accidents in mines, in this state, must be diminished. As a first step, they have issued orders to the mine inspectors of the state, demanding a strict enforcement of the mining laws, in their respective districts, and the arrest and punishment of any and all parties guilty of violations of the law, in accordance with its provisions.

As an excuse for laxity in the enforcement of the mining laws during the last few years, it is said that many operators could not keep their mines in the required condition, because of the weak state of the market for coal. Some companies were even forced into bankruptcy, owing to this cause and the need of maintaining safe conditions in the mine. The coal industry is now reaping a harvest of death from the seed that was sown during this laxity of discipline.

ARREST AND PROSECUTION FOR VIOLATIONS OF LAW HAS A GOOD EFFECT

A shining example of the new policy inaugurated by Governor Lowden and Director John appears in the arrest and prosecution of the superintendent, mine manager, two shotfirers and the two men who drilled the "dead holes" that were the direct cause of the explosion that occurred at the Citizens mine, in Springfield, Feb. 23, 1918, in which four men lost their lives.

At the instance of Director John, an examination was made by James Taylor, who has charge of mining investigations for Illinois, and two state mine inspectors. They reported the results of their investigation to the department, with the result that the arrest and prosecution of the guilty parties was authorized at once.

A second example of the strict manner in which violations of the mining law are to be handled is shown in the arrest and prosecution of the superintendent, mine manager, and night boss of the Virden mine, of the Royal Colliery Co. This action was authorized by Director John as the result of an investigation into an accident that occurred in this mine Feb. 22, 1918, when four men were killed by the explosion of 26 kegs of powder on the shaft bottom.

It is gratifying to know that a new era has now dawned, in Illinois, and is fraught with possibilities regarding the future safe operation of mines. This will prove a great relief to every mine worker who has, heretofore, had no assurance when he left his home in the morning for work, that he would return in safety at night.

The safety-first campaign to which I have referred will certainly save many lives and win for its projectors

a place in the hearts of the 86,000 miners engaged in coal mining in the state. It is to be hoped that they will receive the hearty cooperation of every coal-mining man and operator in Illinois. With the remembrance of the 2695 men who were killed in the mines of this country in 1917, in his mind, everyone's interests in mine safety should be greatly increased.

—, Ill.

STATE MINE INSPECTOR.

American citizens should buy LIBERTY BONDS, because the men we have sent into the perils of the trenches have a right to our support.

First Aid to the Uninjured

Letter No. 3—When this subject was first set for discussion in *Coal Age*, Jan. 19, p. 156, I was inclined to think that there was a catch in the idea that there could be such a thing as giving first aid to the uninjured. However, a little reflection impressed me with the serious conviction that there is truly more need of giving first aid to workers who, through a lack of foresight or by the exercise of insufficient care and caution, expose themselves to danger.

The first aid necessary to be given the uninjured is of a wholly different nature from that which we have been accustomed to practice as "first aid to the injured." The old saying teaches that it is far better to "lock the stable door before the horse is stolen," and the same principle is involved in the idea of giving "first aid to the uninjured."

We cannot urge too strongly the necessity of foresight and keeping in mind the ever-present possibility of accident to the unwary mine worker. For example, the fireboss reports the mine to be safe for work when he has completed his morning examination; and, as the men follow each other into the mine, the foreman gives them the usual instructions to exercise care, telling a miner, "watch that roof in your place," and cautioning a driver to "go slow until we can get a chance to fix that track."

DISREGARD OF CAUTIONARY AID BY UNINJURED

The answer comes naturally, "I will," but how soon is the promise forgotten, and the aid given the *uninjured* proves fruitless and must be followed by *first aid to the injured*, made necessary by an avoidable accident. The foreman's caution and instructions to his men are first aid to the uninjured. His foresight anticipates the possible accident; but, while the aid extended will prove effective in some cases, it will fail in others.

On the one hand, a naturally reckless, though experienced miner, will remember the caution given him when entering the mine in the morning and his careful inspection of the roof before proceeding to work, followed by the setting of a post under a loose piece of top, saves him from a fatal accident. On the other hand, the forgetful worker goes unmindful of the caution given him and becomes the victim of his own neglect. The reply of both of these men was the same, but the one was faithful to his promise, while the other gave it no heed.

Allow me to say, in closing, that the phases to which this injunction of "first aid to the uninjured" can be

applied are many. In the sinking of a shaft, it calls for the careful consideration of the equipment, the headgear, hoisting engine, ropes, shaft timbers, and other details respecting the safety of the work in hand. Not to consider these matters is evidence of lack of foresight.

Again, a certain place in the mine is found to be unsafe and so reported; work is stopped in the place but resumed later before the necessary timber has been set to make it safe. This likewise is an evident lack of foresight on the part of the man in charge. To my mind, the basis of the whole question is self-preservation.

R. W. LIGHTBURN.

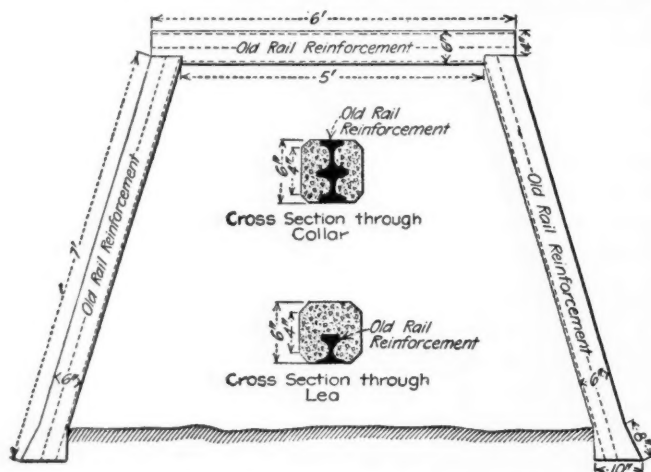
West Leisenring, Penn.

American citizens should buy LIBERTY BONDS, because they represent today the highest form in which a citizen can perform his duty to his country.

Reinforced Concrete Mine Timber

Letter No. 1—Reading the article entitled "Supporting the Roof in Coal Mines," by R. D. Brown, *Coal Age*, Mar. 9, p. 454, leads me to submit for discussion by readers a reinforced concrete timber frame that I devised some two years ago. Five of these frames were made and put in place in an air-course, at that time, and they have stood the test satisfactorily up to the present.

As shown in the accompanying figure, the reinforced concrete collar is supported on two reinforced concrete



REINFORCED CONCRETE-TIMBER FRAME

legs, which are inclined toward the center of the entry in the usual manner. The collar is reinforced with two iron rails arranged with their bases in contact, while the tread of the rail is exposed on the upper and lower surfaces of the collar, as shown in the detailed cross-section on the right of the figure. Each leg is reinforced with a single rail, the base of the rail being exposed on the inner surface of the leg.

The construction of these reinforced concrete timbers is simple and so well understood that a further description is unnecessary. Old discarded rails cut to the desired lengths are used. The ultimate cost of constructing the timbers is trifling, as compared with the price of

steel and wood today. Similar timbers can be made to meet all conditions in mines.

The plan has the advantage that all old rails and pipe can be utilized in this way instead of sending them to the scrap heap. If desired, in order to secure greater strength, four rails can be used in the reinforcement of a collar and two rails in each leg. I gladly recommend the use of such reinforced concrete timbers in mines not subject to heavy squeeze, which might render their use doubtful.

DAVID PHILLIPS.

Coaldale, Penn.

American citizens should buy LIBERTY BONDS, because they are for the purpose of defending his country and his home.

Shotfiring re Explosion

Letter No. 10—Prof. C. M. Young in his letter *Coal Age*, Mar. 2, p. 430, says that he made a number of laboratory tests to establish the inflammability of powder smoke. While admitting that the results obtained were not conclusive in this respect, Mr. Young claims, that there is a possibility of combustible gases being produced when coal is blasted in a close place or heading.

Personally, I have no doubt whatever regarding the production of such gases under the conditions named, and I agree that they are inflammable under favorable conditions. However, I fail to discover any proof that the presence of what he terms "powder fumes" contributed, in his experiments, to the inflammability of the gases.

THE PRACTICAL TEST AND ITS RESULTS

In the practice of coal mining, I have made several thousand tests in blasting coal from the solid in "close places or headings." On going back to the face to fire a second or third shot, I found the place filled with hot powder smoke. The presence of a considerable amount of carbon dioxide (CO_2) was plainly indicated by the pronounced shrinking away of the flame from the wick of my lamp and by the appearance of the flame itself.

Along the floor of these places there was but little smoke and the air was fairly good. There was a perceptible movement of air along the floor toward the face, caused by the sudden rise of temperature in the place. Under such conditions, I have repeatedly lighted the gaseous mixture in the crack of a standing shot, in the presence of a thick and hot cloud of powder smoke that extended from the roof of the heading almost to the floor; but, in no instance, were the "powder fumes" inflamed by these miniature explosions.

Frequently, I have seen the gases extracted from the shattered coal ignite and burn quietly at the face, for a few seconds after the firing of a shot; but in none of the cases observed was there any indication of a continuation or extension of flame by the "powder fumes" present. On the contrary, it appeared that the presence of these fumes had a quenching effect on the flame at the face, and the evidence I saw in this respect, in my investigations of explosions, confirms this view.

Evidently, to my mind, the inflammation at the face was due to the addition of needed air to the hot gases

issuing from the interstices of the coal and extracted from the latter. This air reached the face in the manner just mentioned, which made ignition possible and overcame the quenching effect of the smoke at that point.

On the same page to which I have referred, W. H. Noone alludes to a suggestion someone has made that the circulation of air be temporarily increased in sections of the mine where shots are to be fired. It is fortunate indeed that suggestions of this kind have had but little support. They should be summarily rejected, because the act of increasing the draft in a mine, at firing time, is almost like pouring coal oil on a smoldering fire.

Although I cannot agree with the conclusions of John Moffatt, Mar. 9, p. 470, I appreciate the value of his facts. The phenomena he observed are of much assistance toward reaching a correct understanding of the process by which dust explosions are started and propagated. My views regarding this matter have been stated in *Coal Age* on several occasions, and many of its readers are probably familiar with them. I may say that these views were fully sustained by the results of the tests made at the Eskmeals Experimental Station and described by the late Samuel Dean, in *Coal Age*, Vol. 6, p. 294.

ESKMEALS TESTS SUPPORTED BY PRACTICE

It has been intimated that the Eskmeals tests did not warrant definite conclusions regarding the process of propagation, because they were made under artificial conditions not existing in the practical working of a mine. But the letter of Mr. Moffatt, just mentioned, proves by several tests, made under actual and generally prevailing mining conditions, that the results he obtained fully warranted the conclusions based upon the results shown in the Eskmeals tests.

Mr. Moffatt states that the mine he worked in was new and only down a short distance as mines go to day, that the ventilation was good and no gas present. The phenomena he observed occurred in a close place, that is, there were no crosscuts connecting it with the adjoining places. The coal was undercut and he observed when he fired the two rib shots together, that there were heard after reports or secondary explosions, which apparently grew louder as the place advanced, and, on the last occasion, when he fired the two shots together the sound and force of the after report was heard far out on the lower levels. When the shots were fired separately the last shot, if fired before the fumes were allowed to cool down, gave a low after report.

Mr. Moffatt expresses the opinion that these after reports or secondary explosions were caused by the absence of proper ventilation and the presence of powder fumes. But it will be readily seen that the ventilation of this place or the amount of fresh air entering it and moving rapidly along the floor toward the face was far greater immediately after the shot or shots were fired than at any other time. It is quite obvious that this air movement toward the face was stronger and faster when induced by the combined heat of the two shots fired together than when only one shot was fired and a less amount of heat produced.

The air flowing into the place may have carried with it a small amount of coal dust; but, in any event, it sup-

plied sufficient oxygen to be mixed with the hot gases extracted from the shattered coal at the face to cause their ignition with nearly explosive effects. The noticeable interval between the firing of the shots and the after report is an important feature and the factors developed during that interim and their possible influence in determining subsequent results should have careful consideration.

Chariton, Iowa.

JOHN VERNER.

Our Allies keep on supporting their war loans; Americans will not hang back when the THIRD LIBERTY LOAN calls. Most of the civilized world is united against Germany.

Examination of a Mine

Letter No. 6—My previous letter, relating to the examination of a mine by a fireboss in Colorado, seems to have given the impression to a number of readers that the custom in Colorado, as described, tended to lower the efficiency of a fireboss and the standard of examinations. This is all a mistake.

It is true, as I stated, that the examination of the mine by the fireboss ends when he has returned to the shaft or slope bottom, entered his report and turned the mine over to the foreman who then takes charge and directs whatever work must be done.

The Colorado Coal Mining Laws discriminate between a mine that is generating gas and one that is free from gas. In the former case, the law requires the fireboss to enter the mine, for the purpose of making the early examination, not more than three hours before the time for the men to commence work. In the latter case, this time is extended to five hours.

After the fireboss has made his examination and reported he is allowed one hour to go home and get his breakfast and, on his return to the mine, he reports to the foreman, who naturally sends him to remove any dangers that may have been reported. It should be stated that the fireboss is ordered to do other work only when there are no dangers to be removed.

FIREBOSS' WORK IN COLORADO

Always, in a gaseous mine, there is the understanding between the mine foreman and the fireboss that, on his return from breakfast, he is to devote himself wholly to the extending of brattices and other work pertaining to the ventilation of the mine and the removal of dangers discovered in the working places. Two men are generally employed on the work of building stoppings, doors, etc.

Let me say that the examination of a mine during working hours is the duty of the mine foreman, assistant foreman and safety mine inspector, alike, in all gaseous mines. In my opinion, if this system had been employed generally in coal mines, hundreds of lives would have been saved that have now been sacrificed owing to inefficient or insufficient inspection of the working places.

It is my belief that, in most instances, this great sacrifice of life can be attributed to firebosses being given too much liberty and permitted to work as they choose. Where such a custom prevails in mines, the

firebosses roam about the mine according to their own choice, and the foreman, who is responsible for the safe operation of the mine, seldom knows where the fireboss can be found.

It was this condition that caused the miners of Colorado to urge the enactment of a new law that would give the mine foreman full charge of a mine during working hours and make him responsible for the safety of life and property. We consider this law the best in the world.

ROBERT A. MARSHALL.

Farr, Colo.

That man in khaki, to whom you wished "best luck," wants you to buy LIBERTY BONDS and show that you meant what you said.

Favoritism in Mine Management

Letter No. 5—Speaking of favoritism in bossing, I do not think that any sane manager would place a man in a responsible position because he was a favorite in some respects, or a popular fellow in the community, a "ward healer" or other influential politician, without regard to his ability to produce results in the mine.

Like Mr. Rose, whose letter appeared in *Coal Age*, Jan. 26, p. 213, I believe that men who have been employed a long time in the same position in a mine invariably fall into ruts and wasteful methods. This is strongly characteristic of men of advanced age. A younger person, no matter how much he may know in regard to mining cannot assume to tell the older man that his method is wasteful or unscientific. The result would be that the proffered advice would be ignored entirely or the man told to mind his own business.

It cannot be denied that, under such conditions, a change is desirable and will generally prove the advantage, if not the necessity, of keeping abreast of the times and using the most up-to-date methods and appliances. It goes without saying that a new superintendent will do his best to improve the operations in his charge and make a stronger showing, if possible, than the man who has preceded him and he will generally succeed for a time.

PRACTICE IN MINES IN ENGLAND

In his letter, Mar. 9, p. 471, Thomas Hogarth mentioned instances of men holding positions 20 or 30 years, in the mines of England. He does not say, however, what I believe is true, that the firebosses and other assistants have very little to say about running affairs. As a fact, the Miners' Union control everything pertaining to wages, safety of men, mine laws, etc.; and I would say the mines are far from up to date.

Why it is that there are always some of the men who do not like the coming of a new boss is because they find that he will not turn things loose and let them do as they please, or as they have been accustomed to doing under the old boss. The new boss' first efforts are, naturally, to eliminate waste and secure greater efficiency in every branch of the work.

Mr. Hogarth says that "a new man coming to take charge of a mine should study well the conditions before attempting to introduce new ideas and methods." That is all right; but, let me say, he should not study too long before he tells the men what he is there for.

Speaking from my own experience, a new foreman will not be long in his position before some fireboss or assistant foreman will tell him that his section is in bad shape explaining that the old boss would not let him do what he wanted to make it right. It will then be up to the new man to decide quickly the course he is to pursue. It may prove that what the assistant wants to do is an unnecessary expense, which the new boss must decide.

Where there are no changes made in the working force of a mine, it appears to me more like a lot of men running a race but having no definite goal, which makes the race an endless one. In that case, who cares whether he is on the head end or tagging on the tail, as in England. There, if a man starts in as fireboss, he is apt to continue in the same position. My motto is, "keep things moving and up to date."

Plainsville, Penn.

RICHARD BOWEN.

I'm buying LIBERTY BONDS because this supreme duty is paramount to all other considerations.

Men in Blind Alleys

Letter No. 2—The argument advanced in the letter of Timothy Goldon, *Coal Age*, Dec. 22, p. 1069, is, to my mind, but another reason why young men should study to gain a knowledge of the theory and principles relating to their work. Without such a knowledge of theory, a worker is very apt to find himself, sooner or later, in one of Mr. Goldon's "blind alleys."

A young man is seldom willing to listen to the advice of an honest well wisher who has travelled the road before him and whose words should be an inspiration to him to throw off the shackles that bind him and prove that he is worth while.

The "humble pie" that our friend, Mr. Goldon, describes as the diet of the man in a blind alley is, to my mind, nothing more nor less than a potion that could properly bear the label of the skull and crossbones. The man who is satisfied to continue to eat "humble pie" when he has the ability to do otherwise has had his mind poisoned; he is morbid and of little use to himself or to anyone else.

That "blind alley" is a stumbling block to honest endeavor. It leads nowhere and the employer who is responsible for having such blind alleys in his business or organization is a traitor to the best interests of his men. While he himself resides on an avenue or street that leads somewhere, he has made it practically impossible for his employees to gain the needed exercise that is essential to successful work and service.

Where blind alleys exist in an organization one may properly look for other defects, such as side-stepping capability and the showing of favoritism, through friendship, to the incompetent. I heartily concur with Mr. Goldon's concluding remark, "never permit friendship to override justice, but give the job to the man who can get results." Results speak for themselves.

West Leisenring, Penn.

LUMEN.

I'm buying LIBERTY BONDS because I just can't help it. I'm buying LIBERTY BONDS because there are millions of becauses.

INQUIRIES OF GENERAL INTEREST

What Caused the Explosion?

Kindly permit me to submit a question that has caused me to lie awake nights in a vain effort to solve the mystery. It concerns an explosion that occurred in a mine that was supposed to be free from gas. The explosion took place at a time when no one was in the mine and started, as was ascertained later, in the old workings that were wet.

The mine was ventilated wholly by natural means, there being no fan or furnace. It was a drift opening, and an air shaft 32 ft. deep was located a short distance back on the hillside. Previous to the time when the explosion occurred, the mine had been idle for two months. The question I desire to ask is: Under these conditions, what is it possible to assume was the immediate cause of this explosion, and was it a gas or a dust explosion?

FIREBOSS.

Harrisburg, Ill.

There are instances of mysterious explosions taking place in mines under conditions that make it difficult to offer a reasonable explanation. In the present case, it is stated that the mine was "supposed to be free from gas." This statement, however, may be taken as only meaning that the mine did not generate sufficient gas to be detected by the ordinary means when the mine was in operation.

A period of two months' idleness, it may be said, would give an opportunity for gas to accumulate in the old workings, and a possible fall of roof may have ignited the gas and dust raised by the fall. This would seem to be the most reasonable explanation to offer, but we would be glad to hear from others who may be able to suggest other possible causes.

Money is as necessary for the success of this war as is the circulation of the blood to life. Buy a bond and help the cause.

Preparation of Coal

A short time ago I read with interest an article that appeared in *Coal Age* [Feb. 9, p. 276], treating on the preparation of coal for market.

In the course of his article, the writer described a specially arranged picking-table or screen known as the "Marcus patent picking-table screen." It was stated that the arrangement was such that the coal passed successively over circular perforations $1\frac{1}{2}$ in., 2 in. and 4 in. in diameter, these being separated by blank picking spaces that gave ample opportunity for the thorough cleaning of the coal by picking out all foreign matter.

It has occurred to me that such a screen would be well suited to the preparation of the coal in this district, although I know of none being used here at the present time. The coal we are working is a sub-bituminous

coal which makes a splendid domestic fuel when properly handled so as to prevent undue breakage of the lumps. Owing to the keen competition, in this market, it is necessary for operators here to give particular attention to the cleaning of the coal.

The seam worked, here, contains a little bone which must be picked out in preparing the coal for market. Our practice, thus far, has been to first pass the coal, as it comes from the mine, over a $\frac{3}{4}$ -in. screen 9 ft. long, which delivers it directly into the weigh basket. After weighing, the lump is screened out over a $1\frac{1}{2}$ -in. screen, the egg over a $\frac{3}{4}$ -in. screen, while the nut coal is separated by a $\frac{3}{4}$ -in. screen, the remnant passing through this screen being slack. Owing to the soft nature of the coal, it is necessary that it be handled with care to prevent breakage as far as possible. The several sizes are loaded into box cars for shipment.

At the present time, I am anticipating the erection of a tippie to handle 500 tons of coal in 8 hours, and shall be thankful for any suggestions that may come from the readers of *Coal Age*. Our proposition is young, and the available means being limited, matters of economy in equipment and operation are of much importance. I shall be glad to consider an estimate of the approximate cost of erection of a tippie such as will be adapted to our conditions.

C. S. DONALDSON,

Lethbridge, Alta., Canada. Supt. Federal Coals, Ltd.

We quite agree with this correspondent in his conclusion that the Marcus patent picking-table is well adapted to the preparation of a coal such as he has described. This screen is manufactured by the Roberts & Schaefer Co., McCormick Building, Chicago, Ill., who no doubt will be glad to estimate on the cost of construction of a suitable tippie and equipment designed to handle this coal at the least expense and loss by breakage. We are confident, also, that many operators and superintendents who read this will be glad to offer practical suggestions regarding the economy of operation, through the columns of *Coal Age*.

Buy a LIBERTY BOND. Everyone is doing it.

Barometric Pressure re Air Column

Kindly show the method of finding the equivalent, in feet of air column, per inch of mercury or barometric reading, assuming a temperature of 60 degrees.

Springfield, Ill.

STUDENT.

Since the weight of 1 cu.in. of mercury is 0.491 lb., each inch of mercury column indicates a pressure of 0.491 lb. per sq.in. or $0.491 \times 144 = 70.7$ lb. per sq.ft. But air at 60 deg. is estimated at 13 cu.ft. per lb. and an air column corresponding to a pressure of 70.7 lb. per sq.ft. is therefore $13 \times 70.7 =$ say 920 ft. in height.

EXAMINATION QUESTIONS

Illinois Mine Managers' Examination November, 1917

(Selected Questions)

Ques.—What horsepower will be required to ventilate a mine employing 410 men and 26 mules, when the water gage reads 1.6 in., assuming the efficiency of the fan engine to be 60 per cent.?

Ans.—The Coal Mining Laws of Illinois require a circulation of 100 cu.ft. of air, per man, and 500 cu.ft. per animal per minute, in a mine not generating gas. If the mine is generating gas, the law requires a circulation of 150 cu.ft. of air per minute for each man employed underground, in addition to the amount required for each animal.

Assuming, in this case, that the mine is not generating gas, the volume of air required by law will be $410 \times 100 + 26 \times 500 = 54,000$ cu.ft. per minute. Then, taking the efficiency of the fan and engine as 60 per cent., the horsepower required to produce a circulation of 54,000 cu.ft. under a water gage of 1.6 in. will be

$$H = \frac{54,000 \times 1.6 \times 5.2}{0.60 \times 33,000} = 22.69 \text{ hp.}$$

Ques.—If 27 hp. is producing a circulation of 70,000 cu.ft. of air per minute in a mine, what quantity of air will be produced in the same mine when the horsepower is increased to 64?

Ans.—Assuming the conditions in the mine remain constant, and ignoring the slight change in the efficiency of the ventilating fan, the quantity of air in circulation will vary as the cube root of the horsepower producing the same. In other words, for the same conditions in the mine and a constant efficiency of the fan, the quantity ratio is equal to the cube root of the power ratio, which gives, for the required quantity (x) in this case.

$$\frac{x}{70,000} = \sqrt[3]{\frac{64}{27}} = \frac{4}{3}$$

$$x = \frac{4}{3}(70,000) = 93,333 \text{ cu.ft. per min.}$$

Ques.—A barometer registers 30 in., at the surface, what will it register at a point 1890 ft. below the surface?

Ans.—It is customary to allow approximately 900 ft. of depth for each inch of increase in barometric reading, which gives, in this case, $1890 \div 900 = 2.1$ in. increase. The reading of the barometer will therefore be 32.1 in.

Ques.—To what use is electricity applied in the operation of a coal mine? Name the four electrical units in common use.

Ans.—Electricity is used in coal mining for the purposes of power, lighting and signalling. It is particularly useful in the transmission of power into a mine,

for the operation of coal-cutting machines, drills, electric-haulage locomotives and electric fans and pumps. Many mines are now lighted throughout by electricity, incandescent lamps being used on the haulage roads and travelingways, and electric mine lamps in the working places. Most mines are equipped with some system of electric signalling, using a telephone system or signal gongs. Electric batteries are very largely employed in the blasting of coal, because of the increased safety afforded in performing the work.

The four electrical units in common use are: The ampere, volt, ohm and watt. These indicate, respectively, the strength of the current or quantity of flow; the pressure, or difference in potential between the input and the output of the electric current; the resistance of the current depending on the length, diameter and kind of material forming the conductor; the power of the current, which is expressed by the product of the amperage and voltage.

Ques.—Find the length, in feet, of an arc of 30 deg., the radius being 14 ft.

Ans.—Since there are 360 deg. in a full circle, the length of an arc of 30 deg., for a radius of 14 ft., is $30/360(2 \times 3.1416 \times 14) = 7.32$ ft.

Ques.—What precautions should be taken, in blasting, to safeguard mines that are dry and dusty and generate explosive gas.

Ans.—Under these conditions, the safest method to adopt is to employ competent and experienced shotfirers, whose duty shall be to examine, charge and fire all holes drilled by the miners, and refuse to fire any holes that, in their judgment, are unsafe. The entire mine should be divided into districts and a sufficient number of shotfirers should be employed that ample time can be given for the air current to sweep away the gases generated by the firing of the shots.

Each fireboss should examine each working place before firing a shot therein, to ascertain that it is free from gas and accumulations of fine coal and dust. As a further safeguard in blasting in a dry and dusty mine, a thorough sprinkling system should be installed that will enable the face of each room and entry where shots are to be fired to be sprinkled before firing.

Ques.—In what seasons of the year, and why, are dangers from coal dust to be expected, and to what extent would you allow coal dust to accumulate or to be deposited, before considering it dangerous?

Ans.—The cold winter months present and increased danger from coal dust in mining, because of the comparatively dry condition of the air current circulating in the mine and the larger production of coal in that season than is true in the summer season. In the winter the cold intake current, by reason of the rise in temperature, in passing through the mine, exerts a much greater drying effect on the dust. No dust accumulations should be permitted in any portion of the workings, as the danger is greatly increased thereby.

COAL AND COKE NEWS

Harrisburg, Penn.

Running all anthracite coal mines by electricity may be the Federal Government's next step. The 25 mine inspectors in the hard-coal field held a conference on Mar. 28, to consider electrification on a large scale to aid in the winning of the war. The Federal Department of Mines submitted 10 questions on which it asks information, most of them relating to electrification and to the economies now effected in mines already thus equipped. Engineers of some of the large coal companies say that it will take several months to answer the questions intelligently. Seward E. Button, the new chief of the State Department of Mines, presided.

The age question also was taken up, but no decision as to the adjustment of a conflict in laws of the Federal Government and Pennsylvania laws was reached. The 1917 Federal law prohibits the employment of boys under 16, but the older state law, while barring boys under 16 from working inside the mines, permits those between 14 and 16 to be used above ground.

Car shortage has caused a loss of 211,029 tons of coal in the central Pennsylvania bituminous fields during the week ending Mar. 23, according to a report of J. P. Cameron, district representative of the National Fuel Administration. Mines on the Pennsylvania R. R. divisions in western Pennsylvania produced but 314,613 tons during that period, whereas the capacity of the mines is 525,660 tons of coal.

Mines are being operated only a little more than half their capacity, and there is no prospect of improvement under the present system of car distribution the report states. Labor shortage caused a loss of 9437 tons. The mines delivered 1097 cars to the railroad for fuel during the week and sent but 750 cars to tidewater. The blockade on the Pennsylvania R. R. is almost as serious now as it was during the severe weather of January, Mr. Cameron declares.

The H. C. Frick Coke Co., Pittsburgh, has asked the State Department of Mines whether girls can be employed at lamp-houses where the mine lamps are cleaned and filled. The chief of the department—Seward E. Button—referred the matter to the attorney general, who rendered an opinion to the effect that while women may not be employed in or about the mines females over the age of 16 may be employed in lamphouses if they are some distance away from the entrance of the mines.

In another opinion to Button, C. B. Ross, Latrobe, inspector of the second bituminous district, is informed that he has the power to approve the tapping of an abandoned mine that is filling with water and endangering the workings in an adjoining mine.

The Schuylkill Navigation Co., operating the old canal from Port Clinton to Philadelphia, has given orders to its employees to get the yards and the boats in shape for early service. The company has dredges at work, and various levels have been drawn off to permit mud and culm to be removed from the channel. South of Reading the dams, channels and locks are in good shape, but the winter floods carried a great deal of mine culm to the dams. All have been drawn off and it will take many weeks to clear the channels for the boats. A dredging machine to work pneumatically is expected to go into operation on the canal in a short time. The present dredges are steam machines, not modern in size or pattern. Work on repairing the ice-broken dam at Norristown, in the Schuylkill River, is reported to be making progress. It is necessary to the operation of the canal.

The Anthracite Consumers' League issued a statement on Mar. 29, rejecting a proposed compromise with the coal companies of the Schuylkill region whereby the taxes on the coal lands in Schuylkill County were to be increased from 60 to 100 per cent. The league asserts that in order that the coal land taxes in this county shall equal those in other counties

an increase of 1000 per cent. should be made in the coal assessment. The league says, "We are witnessing now the spectacle of mendacious corporations, fairly rolling in wealth, holding up the education of little children because the trust has the political power to cheat the public treasury." In order to sidetrack the raising of taxes the league says the coal companies will try to raise the rates on individuals.

One of the most serious problems confronting the anthracite operators at the present time is the difficulty in securing sufficient timber to properly insure the safety of the miners. This is especially true of the heavier timber needed for gangway purposes and at the present time operations have been temporarily halted on account of the inability of timber contractors to meet the ever-increasing demands upon them.

Birmingham, Ala.

Steel plants, foundries, railroads, machine shops and other coal and coke-using industries in the Birmingham district are operating at capacity limit, and as a result business in coal circles during the week reflected marked activity. All coal consuming industries report a congested condition as far as orders in hand are concerned and prospects are for further accumulation.

Coal mining is active and production at the mines continues to improve. There is no easing up in the supply by any means. Many persons are seeking an opportunity to begin stocking up on coal for next winter's needs, in accordance with the ideas of the Fuel Administrator, but so far there has been no coal offered on the market. Coal companies are maintaining that all attention must be given to production and delivery.

There is practically no labor dissension of any magnitude in the district. One of the larger mines of the Woodward Company lost a day's output during the week owing to a local lay-off, but the differences were quickly settled and practically every mine is working its full force.

Chairman Frank B. Fowlkes, of the Jefferson County Fuel Board, and Secretary J. H. Duncan, after an exceedingly busy week reported on Mar. 30 that practically every retail dealer in this district had been supplied with the new customers' cards. These cards are issued under the direction of the Federal Fuel Administrator, and the new regulation which became effective Monday requires that each customer fill in the card stating his needs and other information, before a delivery is made. The order applies to householders, public utilities and all industrial users of coal alike. The county board on Monday inaugurated a campaign to educate consumers up to the need of putting in their supplies as early as possible, and a house-to-house, industry-to-industry campaign is planned.

The final figures on coal production in Alabama, as well as the coke output for the past year, are now being tabulated, and there is an increase shown in the comparison with the figures of the previous year. The coal production in 1917 went to about 20,500,000 tons against 18,086,197 tons in 1916 and 14,927,937 tons in 1915. The coal production during the first three months has been sufficient to bring out an estimate that Alabama will produce this year not less than 22,500,000 tons of coal.

The coal production for the past year will be between 5,000,000 and 6,000,000 tons, while in 1918 the production should be at least 6,500,000 tons. There is a demand for every ton of coal and coke, and the labor question is the controlling issue in regulating the production.

There is need for men at many collieries in this state. The coke ovens are not here to increase the coke production very much, but all the ovens here will be kept in steady operation so that every demand may be met and the production for the year maintained.

The coke production, however, even under the most favorable conditions, could be only a trifle greater than it is now. Prices are fixed by Governmental regulation, but

the margin is sufficient to allow a satisfactory profit for the producer, ample to stimulate capacity production.

Charleston, W. Va.

That car shortage is one of the biggest factors in limiting the production of coal in West Virginia is illustrated by production figures for the Pocahontas and Tug River districts for the week ending Mar. 23, the total output for that week in the districts mentioned being over 426,000. The total tons lost was 98,909, and of that tonnage 73,426 tons were lost because of car shortage and 20,760 tons were lost because of labor shortage, the ratio being 2 to 7. However, the tonnage produced and shipped from the Tug River and Pocahontas fields has exceeded the prediction made a week or so ago by the pessimistically inclined that the tonnage for the districts referred to would show a material decrease.

In the northern part of the state the car situation is so bad that there is almost open warfare between the lines in the Fairmont field and the operators there. It is claimed that the regional car supply there is almost 6000 cars short. The claim is made by the operators that the Baltimore & Ohio is discriminating against the Monongah Division which taps the Fairmont field in favor of the Pittsburgh division, where the competition is keener and where the operators charge the Baltimore & Ohio is afraid to fall behind with its car supply lest competing lines secure the business. The operators even claim that the Pittsburgh division is ahead of its quota.

Coal operators believe that the only remedy for the inability of the railroads to furnish cars is to build more cars and that the building of such cars is almost as important as building more ships, because each is dependent on the other as a means of transportation.

Governor Cornwell has signified his willingness to call a conference of representatives of the various coal associations in West Virginia to discuss plans for extending and enlarging the export coal trade with the South American countries after the war, in accordance with a suggestion made by the "West Virginia Mining News," if the various associations approve the suggestion for such a conference. The governor on Apr. 2 addressed a letter to the president and secretary of each of the coal associations, in which he expressed himself as being in hearty sympathy with the movement to enlarge the market for West Virginia coal at the end of the war.

Louisville, Ky.

The Interstate Commerce Commission at a hearing in Louisville last week took under advisement complaints of the Ohio Valley Coal Operators' Association relative to freight rates on western Kentucky coal being unfair to the operator, and asking that rates from western Kentucky to Louisville be made on a basis of \$1.05, the present rate as from eastern Kentucky, instead of \$1.45. In addition through rates are asked for shipments from western Kentucky mines to points in Indiana, Ohio and Michigan. The railroads directly affected are the Big Four, Illinois Central, Louisville & Nashville, Chesapeake & Ohio, and Pennsylvania principally.

The plaintiffs, represented by J. V. Norman, of Louisville, asked for rates which would enable them to go into the Covington, Ky., and Cincinnati district, and into sections north of the Ohio. It was shown that no progress has been made in western Kentucky for several years due to an unfair freight rate, which has favored shipments from eastern Kentucky, and made it impossible to compete against mines in Indiana and states north of the river.

Indiana operators were represented by attorneys who endeavored to show that reduction of rates would result in greater

competition as for the Indiana mines, and they made a strong protest against any reduction in the rate.

The hearing principally developed that present rates are unfair to western Kentucky operators, and that Indiana operators would be more than willing to see the western Kentucky mines operated at a loss rather than take a chance on the Kentucky product being given a square deal, and allowed to enter into competition.

PENNSYLVANIA

Anthracite

Locustdale—Bancroft mountain is to be stripped of its surface for a distance of two miles and the great coal veins will be exposed to the open air. It will thus be possible to undertake daylight mining on a greater scale than ever before attempted in this region. The Philadelphia & Reading Coal and Iron Co. is undertaking the work, having acquired the tract from the Bancrofts, who were a firm of independent operators who developed tracts of coal extensively near here a half century ago.

Hazleton—Coal companies of the Lehigh field are turning down new business every day. This was announced on Mar. 28, in connection with rejection of an order from a Canadian firm which wanted a half million tons of anthracite delivered before fall and offered to pay in advance. Most of the efforts to get fuel are made by the Canadian factories which are not permitted by the Government to stock up this summer and those owners are desperate in their anxiety to secure supplies. The operators here cannot take any new business, as their output is already engaged.

Glenlyon—Two miners were entombed in the mines of the Alden Coal Co. on Mar. 27, when a fall of rock occurred in one of the gangways, shutting off communication. One of the men was rescued about 20 hours later by a number of fellow workmen, who had worked all night clearing away the rock. The other man, Adam Krenzneskie, was found dead on Mar. 29 when the party of rescuers broke through the fall.

Pottsville—Announcement has been made by the Philadelphia & Reading Coal and Iron Co. that extensive tracts of land owned by the company will be placed at the disposal of its employees for "war gardening" purposes. The lands, which are fertile, are located throughout Schuylkill and Northumberland Counties, and the work will be directed by a scientific agriculturist. W. J. Richards is president.

Tower City—The United Mine Workers of America, Local No. 1261, have made announcement that \$4000 will be subscribed to the Third Liberty Loan, and \$1000 for War Saving Stamps.

Bituminous

Osceola Mills—The Liberty Coal Mining Co. is installing new equipment at its shaft mine near here. When the improvements are completed the mine will operate on central station power and the capacity of the mine will be materially increased. Charles M. Means, of Pittsburgh, is consulting engineer.

Pittsburgh—A new corporation organized in Pennsylvania, the Orenda Smokeless Coal Co., on Apr. 1 purchased from the Merchants Coal Corporation, of Pittsburgh, Penn., its Orenda mine, together with about 1700 acres of unmined coal, at Boswell, Somerset County, Pennsylvania, on the Baltimore & Ohio R. R. The mine has a capacity of 2000 tons per day and is operating in the C seam of coal, by means of a slope from the outcrop. The property includes several farms and a considerable acreage of the E seam of coal, together with a slope, known as Orenda No. 3, driven down about 1000 ft. several years ago but not equipped or provided with railroad facilities. The sale includes the stock of the Boswell Land and Improvement Co., the Boswell Electric Co. and the Jenner Water Co., the two latter furnishing light and water to the incorporated village of Boswell. A. W. Calloway, of Baltimore, Md., president of the Davis Coal and Coke Co., is president of the new company.

Corning—A vein of soft coal 5 ft. thick has been discovered on the Davenport farm, about 35 miles north of the coal fields of Tioga County.

Washington—Fourteen hundred acres of coal land in East Finley township have been optioned by J. S. McGill, representing Pittsburgh coal operators, at a price of \$182,000.

WEST VIRGINIA

Mercer—The Louisville Coal and Coke Co. and other coal companies have been sued by R. C. Reed and Dora A. Lilly, in the circuit court in Mercer County, for \$10,000 damages. It is alleged that property of the plaintiffs was injured by the coal operations dumping cinders into the Bluestone River, these cinders being washed upon their land.

Wheeling—The Echo Coal Co. is opening a new mine at Edgwood, near here. The concern has taken over the Dailer tract, as well as 81 acres of the Pittsburgh seam, which was purchased from J. A. Chambers. Contracts have already been let for the concrete opening to the mine, as well as for a large concrete air shaft. It is expected that the operation will be producing 200 tons a day by June 1. E. K. Delaney, president of the Burlington Coal Co., of Martins Ferry, Ohio, is head of the Echo company.

Kingwood—The new Florence mine of the Deaker Hill Coal Co., on the West Virginia Northern R. R., was opened on Mar. 27. The tippie has been completed, and it is believed that the mine will be a big producer.

Bluefield—The Borderland Coal Co., at Borderland, Mingo County, has awarded a contract to W. B. Elswick, of Williamson, to erect 40 one-story brick cottages. The houses will have asphalt shingle roofs, hardwood floors and electric lights.

Fairmont—At an emergency meeting of the Central West Virginia Coal Operators' Association held here last week, F. J. Patton was elected secretary of the association. Mr. Patton has been acting secretary for the last month or so. The executive board pledged itself to support the Government in every way and also the railroad and fuel administrations, though lamenting the fact that under railroad administration orders fuel must be shipped west instead of east, in the markets of which most of the companies have their contracts.

Philippi—Its members handicapped by their inability to secure an adequate car supply, a special meeting of the Tygarts Valley Coal Association was held at this place last Tuesday. The wagon mines have felt the pinch particularly, according to statements made by members.

Hinton—A new tippie, with shaker screens, loading booms, etc., is being built by the Turkey Coal and Coke Co., which operates in this field.

INDIANA

Terre Haute—A series of meetings of coal miners is now being held over the state, the speakers to be sent to the state by the National Fuel Administration. The meetings are being held at Clinton, Linton, Bicknell, Terre Haute, Twelve Points, Dugger, Winslow and Boonville. The meetings were arranged by request of the Indiana Fuel Administration and are designed to bring the miners of the state into closer contact with National fuel problems.

ILLINOIS

Hillsboro—Six Italians have been arrested here on suspicion of having been implicated in an apparent attempt to blow up the Panama Coal mine. In a sack at the bottom of the shaft 25 sticks of dynamite were found, communicating with which was a fuse with a detonating cap. The fuse had been lighted but had gone out after burning several feet. Shortly before the discovery was made three men were seen running away from the air shaft. A room occupied by some of the Italians was searched and I. W. W. literature and letters were found.

O'Fallon—Two kegs of powder were exploded Saturday, Mar. 23, in the Prairie mine. The explosion occurred at a point about half a mile from the shaft and the same distance from the air shaft, in a room approached by an untracked entry. The explosion occurred just after the miners had passed on their way to work. A fuse about 20 ft. in length was found in the entry. A stone weighing about 200 lb. had been placed on the two kegs. State mining officials and the Government secret service are investigating.

Duquoin—The Harris-Dillovou-Dimond Coal Co. has been formed by the consolidation of the Crown Coal Mining Co., the West Franklin Coal Co. and the Modern Coal Co. The new company will develop Williamson County coal land and will have a capacity of 5000 tons a day. The object of the consolidation is to work out economies and to increase production. The officers are John M. Dillavou, president; Chester A. Harris, vice president; Eugene Stevens, secretary, and Jesse Dimond, treasurer.

Virden—The North Mine, which has been closed down has been reopened. A new fan has been installed which is modern in every way and exceeds the minimum requirement set by the state for mines the size of the Virden shaft.

Springfield—Damages for \$12,500 have been awarded Charles J. Lemasters in a suit filed by the Springfield-Chicago Mining Co. A piece of defective track threw a car he was driving off the track, which caused it to collide with a mine support. A piece of slate was loosened in the roof which fell and struck Lemasters in the back of the neck, breaking one of the vertebrae.

Belleville—Every miner in the Belleville territory has pledged himself to buy a Liberty Bond of the third issue, the purchases being made on the installment plan. It is estimated that there will be 400 bonds purchased by miners in this territory.

OHIO

Crooksville—The New York Coal Co. has started work on its new mine opening on the Woods farm near here.

KENTUCKY

Harlan—The short supply of cars which has been received in this district for several months past is resulting in many miners deserting mines on the Louisville & Nashville and going over to the mines located on the Norfolk & Western, where a much better supply of cars is resulting in the operators being enabled to guarantee steadier work. Many miners stuck through the shortage during the winter under the impression that steady work would be afforded in the spring and summer. Without this work materializing they are being forced to make changes.

Harlan—The United States Steel Co. has been bringing men into the district in coach loads for hastening development of the new plant on the Poor Fork Branch. This plant will be completed probably within five months and will have a considerable production, which will be shipped to company steel plants.

Louisville—Apr. 15 has been set for Louisville interests to start reorganization of the old Continental Coal Co., which will become the Federal Coal Co. The old Continental Coal Co. entered bankruptcy during May, 1916, as a result of Chattanooga interests refusing to abide by a settlement agreement. The reorganization is a result of action taken by the United States Circuit Court of Appeals, Sixth District, affirming the opinion of Judge Cochran, of the United States District Court, Eastern District of Kentucky, in the case of S. Thurston Ballard against the Federal Coal Co. of Delaware and persons interested. The suit was on behalf of about 100 persons holding about \$1,000,000 of stock in the old Continental company. The new company will take over 16,000 acres of coal land and operations at Pineville.

Whitesburg—The Kermon Coal Co., at Hamden, Ky., has made several improvements in its plant and equipment, enabling the company to increase its daily output to 12 to 15 cars.

Whitesburg—The Marion Coal Co. is making an important development on Rockhouse Creek, where the new mining town of Coalvein is being established about a mile from Blakey. A number of new mines have sprung up along a new Louisville & Nashville branch being constructed into the district.

Stanford—The Boering Land and Mining Co., which has large coal and timber interests in Harlan and adjoining counties, recently declared a dividend which takes \$18,000 from the surplus fund. At this meeting John W. Fox, the noted Kentucky novelist, was elected a director of the company, succeeding his late brother, James W. Fox, who died last winter. Mr. Fox for many years has been close to big developments in the fields, having lived near Cumberland Gap the greater part of his life, and having based several big selling novels on Kentucky developments.

NEW MEXICO

Gallup—The old Thatcher mine east of town, which has been idle for several years, is to be worked again and will be producing coal soon. S. E. Wood and J. Stewart are to operate the mine.

Foreign News

Amsterdam, Holland—The newspaper "Handelsblad" learns from a German source that after Mar. 31, when the economic arrangements between Holland and Germany expire, the export of coal to the former will cease.

Sydney, Australia—Australia miners unions have decided to go into business as mine-owners. The Newcastle Colliery Employees' Federation will be the first in the field, having voted this week to acquire control of a large mining property.

Personals

Charles A. Braun has been appointed assistant sales manager of the Stonega Coke and Coal Co., with offices at 1727 Land Title Building, Philadelphia, Penn.

L. R. Taylor, who recently resigned as superintendent of the Virginian Ry., at Princeton, has formed a connection with the J. C. Sullivan mines in Raleigh and Wyoming Counties.

D. G. Thomas, mine superintendent of the Union Pacific Coal Co., at Rock Springs, Wyo., has resigned to accept a similar position with the Megeath Coal Co. at Winton, Sweetwater County, Wyoming.

Stanley Gleason, of Pittsburgh, Penn., has been promoted, effective Apr. 1, from the position of transitman to the division engineer of the Pittsburgh division of the United Coal Corporation to succeed W. H. Hogue, resigned.

W. E. Davis, of Hazard, Ky., has sold a controlling interest in the First Creek Coal Co. to E. L. Douglas, Jesse Morgan and some Detroit interests, and personally will give his attention to developing the property of the Midland Coal Company.

T. V. Smith has been promoted with the Solvay Collieries Co. from the position of assistant to the chief engineer with headquarters at Huntington, W. Va., to the position as assistant superintendent of the company's Coaldale colliery at Hellier, Ky.

Capt. G. W. Shaw, for five years district manager at Louisville for the Pittsburgh Coal Co., has been transferred to the Pittsburgh division. Captain Shaw, during his stay at Louisville, has looked after the river traffic work, which has lightened in this district to such an extent that he has been placed in charge of the work on the Monongahela River. E. T. Quinby, the company's local secretary, will look after the river end.

Trade Catalogs

Hughes Mechanical Gas Producer. Wellman-Seaver-Morgan Co., Cleveland, Ohio. Bulletin. Pp. 8; 8½ x 11 in.; illustrated. Describes the features that have made this gas-making machine popular with a large number of users.

The Tuerk and Hunter Electric Fans. Frank H. Seely Jr. Co., 421 Widener Building, Philadelphia, Penn. Folder. Pp. 8; 3½ x 6½ in.; illustrated. Contains specifications and prices of oscillating, non-oscillating and ceiling types of electric fans.

Link-Belt Roller Chains. Link-Belt Co., Chicago, Ill. Booklet No. 358. Pp. 16; 6 x 9 in.; illustrated. Was issued to give preliminary information on recent roller chain developments, pending the revision of the company's No. 257 Roller Chain Data Book.

Automatic Reclosing Circuit Breakers and Relays. The Automatic Reclosing Circuit Breaker Co., Columbus, Ohio. Bulletin No. 30. Pp. 20; 8½ x 11 in.; illustrated. Gives a general description and the theory and application of this concern's automatic reclosing circuit breakers and relays for the protection of direct-current circuits.

The Pump That "Manistee" Builds. Manistee Iron Works Co., Manistee, Mich. Booklet. Pp. 20; 9 x 6 in.; illustrated. A rather unique publication descriptive of the RoTURBo pump built by the Manistee Company. On first opening the book the complete assemblage of a multi-stage pump is shown. As each page is turned the view discloses the pump with a part removed.

Industrial Storage Battery Locomotives. Jeffrey Manufacturing Co., Columbus, Ohio. Catalog No. 231. Pp. 24; 6 x 9 in.; illustrated. Contains interesting illustrations and description of various installations, information regarding details, as well as useful data for users of storage-battery locomotives, with particular emphasis on the employment of this well-known locomotive by industrial plants, lumber yards and contractors.

How to Save Coal. Bailey Meter Co., 141 Milk St., Boston, Mass. Bulletin No. 41. Pp. 20; 8 x 10½ in.; illustrated. Just at the present time, when the need for economy in the use of coal is so urgent, this bulletin, with its valuable suggestions on steam generation, should be on every power plant official's desk. The Bailey meter accurately records the steam flow on a uniformly graduated 12-in. circular chart, reading directly in per cent. boiler rating; or if desired in thousand pounds per hour or boiler horsepower.

Community Homes Built With Steel Forms. The Hydraulic Pressed Steel Co., Cleveland, Ohio. Booklet. Pp. 31; 8½ x 11½ in.; illustrated. The title page of this booklet, which is an excellent example of the printer's art, states that it was issued for the purpose of assisting those who are giving consideration to the much discussed question of industrial homes. Under different chapter heads is described fireproof, sanitary, industrial houses, together with first cost, permanency and low maintenance. The booklet is excellently illustrated by two-color halftones and line drawings, and reflects the experiences of the Hydraulic Pressed Steel Co. and its effort to combine profit-producing with the welfare of every employee.

Industrial News

St. Louis, Mo.—Effective April 1, the Old Ben Mining Corporation, the largest Franklin County coal operator, closed its St. Louis office. The headquarters are in Chicago.

Philadelphia, Penn.—The Pennsylvania Supply and Equipment Co., of 421 Widener Building, has been succeeded by the Frank H. Seely, Jr., Co. The change affects the firm name only and was effective as of Apr. 1.

Cleveland, Ohio—The Lakewood Engineering Co. announces the opening of a district office at 448 Broadway, Milwaukee, Wis., with Frederick T. Kern and J. N. Young, both formerly of Kern, Hunter, Inc., as its representatives.

Columbus, Ohio—The combined offices of the Gem Coal Co., the Doanville Coal Co., and the Cleveland & Philadelphia Coal Co., the latter a selling agent for the other two, which produce coal, have been moved from the Huntington Bank Building to the Capitol Trust Building.

New York, N. Y.—The annual report of the Central Coal and Coke Co. for the year ended Dec. 31, 1917, shows net profits of \$819,583, as compared with \$334,224 for 1916. Gross profits amounted to \$1,258,989, against \$673,269 the year before. Combined net profits of Central Coal and Coke Co. and Delta Land and Timber Co. totaled \$1,302,496.

Columbus, Ohio—The new rulings of the Federal Railroad Commission regarding the use of open coal cars by small "wagon mines" will permit several hundred such mines in central Ohio to open for operations during the spring and summer months. These mines were forced to close during the winter on account of the refusal of the authorities to permit cars to be placed for them.

New York, N. Y.—Dodd-Dubosque Company, Inc., announces that it has succeeded to the investigation, sales plans and advertising business formerly conducted by the J. D. Barnhill, Inc., at 110 West 34th St. New York City, with offices at the same address. The officers of the new company are as follows: Philip S. Dodd, president; Clayton Dubosque, vice president and treasurer; William T. Andrews, secretary.

New York, N. Y.—MacGovern & Co., of 114 Liberty St., well-known dealers in second-hand equipment, announce the opening of branch offices at Pittsburgh, Penn., and St. Louis, Mo. The office in Pittsburgh is located at 498 Union Arcade, and is under the direction of L. H. Tippins and W. L. Sprengle. The St. Louis office is at 315 North 12th St., and is under the direction of R. S. Fisher, district manager.

Houghton, Mich.—Calumet & Hecla subsidiaries are suffering considerable loss through continuance of the stubborn fire that for two weeks has been burning steadily in the soft coal pile at Dollar Bay. Fighting this fire has been a costly task and it is not yet under control, notwithstanding two steam shovels and a crew of 60 men have been removing the coal steadily. Gas from the burning pile reaches Houghton, Hancock and Dollar Bay communities. Over 100,000 tons were stored.

Cincinnati, Ohio—Suit has been filed in the Common Pleas Court by the Andrews Steel Co. and the Newport Rolling Mills Co., both of Newport, Ky., against Jewett, Bigelow & Brooks, alleging failure on the part of the coal concern to furnish coal to the steel companies as provided by contracts said to have been entered into, and total damages of \$117,000 are asked in consequence by the plaintiffs. The contracts upon which the suits are based are alleged to have provided for the delivery of 75,000 tons of coal.

St. Louis, Mo.—Coal wagon drivers have made a demand upon the Coal Haulers' Service Exchange for an increase in wages of \$3.50 a week. Officials of the service exchange say that the demands will be granted. An appeal will be made to the St. Louis fuel committee for permission to advance the price of coal sufficiently to cover the increased wages. The bureau is composed of wagon-lot dealers who do not have switches. A. W. Powers is president and William Kay secretary.

Louisville, Ky.—Inability to obtain rails, machinery and equipment of various kinds is resulting in several planned developments being held up. One eastern Kentucky mine has been ready for some time to start shipping five cars a day, but has been waiting for five months for delivery of aero baskets and ropes, the other work having been recently completed. At the present time terminal congestion at Louisville, Cincinnati and other points is resulting in equipment being held up indefinitely that should make fast time.

Columbus, Ohio—Notices have been sent out through the Ohio branch of the National Council of Defense and the Ohio Fire Marshal's office that all handlers and users of explosives will have to take out a license. Alien enemies and all persons who are subjects of nations at war with the United States will be refused licenses. Violation of the act and failure to secure a license will lay the person liable to a fine of \$5000. Licensing agents are located in every county. All coal operators who use explosives will be required to secure the license.

Louisville, Ky.—H. B. Hanger, of Richmond, Ky., and H. P. Mason, of Frankfort, Ky., of the Mason & Hanger Co., contractor who built Camp Taylor, at Louisville, and who are installing switches and connections at the new Federal powder plant at Nashville, besides handling many large Government contracts, are incorporators of the new house of Mason, Hanger & Coleman Co., of Charleston, W. Va., which is incorporated with a capital of \$100,000 for the purpose of constructing railroads, waterworks, locks, dams, sewers and public works generally; to acquire, manage and operate coal, iron, oil and timber properties. The other incorporators are also Kentuckians, including Frank Chinn, of Frankfort; L. B. Weisenburger, Jr., and W. O. Furr, of Frankfort.

Pittsburgh, Penn.—Effective as of Apr. 1, 1918, Colonel Henry P. Bope has resigned his position as vice president and general manager of sales with the Carnegie Steel Co. to devote his time to private interests. Colonel Bope became connected with Carnegie Brothers & Co. in November, 1879, and has remained continuously in the sales work of that company and its successors up to the present time. He has been succeeded in office with the Carnegie Steel Co. by William G. Clyde, who was assistant general manager of sales at Pittsburgh in charge of the Bureau of Bars and Hoops. Mr. Clyde by the promotion has also become a member of the board of directors of the company. Charles L. Wood long assistant to Mr. Clyde, has been promoted to be assistant general manager of sales in charge of the Bureau of Bars and Hoops.

New York, N. Y.—During 1917 the Pennsylvania Railroad Co. carried over its various lines 10,721,121 tons of anthracite, 50,205,005 tons of bituminous and 14,482,474 tons of coke, a decrease of 1,166,315 tons of anthracite, an increase of 2,551,704 tons of bituminous and a decrease of 1,877,819 tons of coke as compared with the tonnages transported in the previous year. The coal consumed by locomotives during the year amounted to 17,557,309 tons, an increase of 1,360,800 tons over the previous year. The company has on its rolls 3304 pensioners, an increase of 184 over 1916, and the pensions paid during the year amounted to \$1,473,605.06, an increase of \$290,905.34 over 1916. The oldest employee receiving a pension during the year attained the age of 96 years; while the average age of all pensioners, as of Dec. 31, 1917, was 72 years, 10 months.

MARKET DEPARTMENT

Weekly Review

Uncertainties Being Cleared Away—Anthracite Demand Strong with Little Likelihood That Enough Will Be Mined To Meet Requirements—Bituminous Production Still Far Below What It Should Be Due to Poor Car Supply—Active Market—Some Talk of Cancelling Contracts

THE National Fuel Administration is making rapid strides in the work of clearing away the uncertainties besetting the coal industry. A zoning policy has been announced; new price regulations have gone into effect; jobbers are practically unhampered in their methods of doing business; local fuel administrations in the different states have been organized to take charge of distribution—in short, the path is being smoothed for a quick movement of coal from the mine to the consumer's bin.

Now the cry is for production—for more and yet more coal. The demand for anthracite is insistent. Stocks are down to rock bottom, notwithstanding the fact that record tonnages are being produced at some mines. With the added demand that will surely come from household consumers during the next few months there arises the question, "Will the output equal the requirements?" It is hard to see how this can be answered in the affirmative, though it is a bit too soon to be pes-

simistic. Just at present, however, the number of cars handled at the loading piers shows an improvement that under ordinary conditions would be sufficient to create a surplus, but which now indicate that the demand is more than keeping pace with the supply. Dealers are accepting orders subject to Fuel Administration regulations, though no contracting is reported for the smaller coals.

No improvement in conditions is reported from the bituminous mines. In the large district about Altoona, Penn., the car supply has been far below normal, and the motive power available is insufficient to clear the yards promptly enough to insure regular movement of cars to and from a large number of operations. Hundreds of mines in the bituminous district of Pennsylvania have been idle for days, one particular mine in this district not having received a car in over three weeks. From West Virginia, Kentucky, Illinois and Indiana come like reports. The results are a material reduction in output at

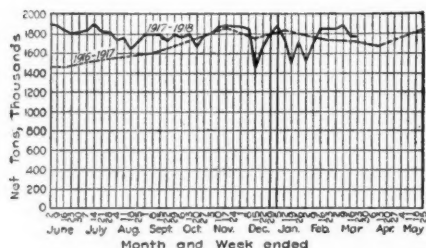
a season when every condition should be favorable and an increasing disinclination on the part of operators to make commitments for months ahead. Until there is some policy with regard to assigned cars that shows some evidences of being consistently carried out, it will be impossible for many mines to work more than half time. Not much improvement can be expected under the present system of car distribution.

The market showed signs of activity during the past week, though the trade is still a little uncertain due to the fact that the making of contracts is confounded by Government commandeering and preferential shipment orders. The zone system is also adding complexities. There is some talk of the Government cancelling all contracts for coal which did not expire on April 1, the idea being that such a step would eliminate all high-price contract coal and place the entire production of the country under control of the Fuel Administration.

COAL PRODUCTION

Production of bituminous coal increased slightly during the week ended Mar. 23. The total production (including lignite and coal made into coke) is estimated at 10,972,000 net tons. The average production per working day is estimated at 1,828,000 net tons as compared with 1,729,000 net tons during March, 1917.

The total production of beehive coke is estimated at 635,000 net tons, or 106,000



tons per working day; a decline in average daily production of 1000 tons compared with week of Mar. 16. The production in the Connellsville and Lower Connellsville districts, as reported by the "Courier," increased from 335,122 tons during the week Mar. 16 to 339,580 tons.

Anthracite shipments increased from 42,265 to 42,487 cars.

The ratio of production to present capacity declined from 70.6 per cent. in the week ended Mar. 9 to 66.3 per cent. for the week of Mar. 16, due in part to transportation difficulties in the east and in part to absence of orders for coal in the far west. The lack of demand for coal in the Southwest, Rocky Mountain and Pacific Coast States was even more no-

ticeable than during the previous week. Mines in these states reported a loss of 275,296 tons due to "no market," compared with 201,006 for week ended Mar. 9.

The reports of conditions in the Connellsville and adjacent coke regions for the week ended Mar. 23 show continued improvement. Fifty-seven of the principal operators in the Connellsville, Greensburg and Latrobe districts reported a produc-

CARLOADS OF COAL AND COKE ORIGINATING ON PRINCIPAL COAL-CARRYING ROADS

Week Ended:

Mar. 2 Mar. 9 Mar. 16 Mar. 23

Bituminous shipments, 123 roads..	197,415	200,239	190,298*	191,525†
Anthracite shipments, 9 roads...	39,875	41,807	42,265*	42,487†
Beehive coke shipments, 4 roads...	12,911	13,032	13,218*	13,040†

* Revised from last report. † Subject to revision.

tion of 273,420 net tons or 65.6 per cent. of their full time capacity as compared with 64.1 per cent. during the preceding week. Losses due to shortage of cars and labor slightly declined. The same operators produced 152,400 net tons of coal.

The ratio of production to capacity of byproduct coke plants during the week ended Mar. 23 (87.8 per cent.) was the same as in the previous week. The losses on account of lack of coal represented 6.4 per cent. of capacity, the same as the previous week. Kentucky, Maryland, Tennessee and Washington increased their production to maximum capacity. The lowest ratio reported—in New Jersey—was 79.6 per cent., an improvement over 76.5 per cent. in the previous week. Indiana was the only state reporting decrease in production during the week ended Mar. 23 due to lack of coal.

BUSINESS OPINIONS

Marshall Field & Co.—Current wholesale distribution of dry goods is well in advance of the corresponding period of a year ago. Road sales for both immediate and future deliveries show good increase over the same period in 1917. Merchants have been into market in slightly smaller numbers. The market on domestic cotton goods continues strong. Collections are good.

Bradstreet's—Trade expands as the season advances, and optimism grows, though many chafe under price regulations imposed by the Government. Lack of labor, dearth of materials and paucity of cars prevent even heavier movements. An early Easter, accompanied by favorable weather, has brought retail trade to the forefront, buying from wholesale dealers for fall shipment is active, industry is brisk, collections are more favorable than otherwise, crop news, except for absence of rain in the southwest, is excellent, and widespread preparations are being made for increased planting this spring.

Dry Goods Economist—Due partly to the financial outlook and partly to shortage of labor and of raw materials, there is nothing surprising in the predictions heard on all sides that still higher prices for textiles will prevail. There has been no recession in the prices of raw cotton, silk or wool. Instead, the markets are firm and some advances have been noted. Raw cotton, for example, reached 34.40c. this week, the advance being based on reports of continued drought in the Southwest.

American Wool and Cotton Reporter—The wool supply is becoming scarcer and the market becoming stronger. One feature of the week under review has been the cleaning up of practically all the 4s and 5s B. A. wool in the market. The woolen goods market remains steady—with produc-

tion up to the highest possible point under existing conditions. Manufacturers expect that there will be sufficient shortage of goods to make possible at least reasonable profit margins.

Iron Age—A remarkable recovery in pig-iron production is shown by the statistics for March gathered by wire from 344 blast furnaces. The total was 3,213,091 tons, or 103,648 tons a day, as against 2,319,399 tons in the 28 days of February, or 82,835 tons a day. As coke supply has increased, more furnaces have wheeled into line, the net gain in the month being 24. The 344 coke iron furnaces in blast Apr. 1 were producing at the rate of about 106,500 tons a day, as compared with an actual average production of coke iron in the year 1917 of 105,000 tons a day.

Atlantic Seaboard

BOSTON

Jobbers file application for licenses. No clear program, and apparently no action on assigned cars. Buyers in quandary. No improvement in Tidewater receipts. Rail shipments fair. Bottoms extremely hard to get. Hampton Roads dispatch good. Distribution the coming year a serious problem. On present consumption industry will keep running, but where will be the reserves? Pennsylvania operators largely unresponsive. Selling connections of many years standing given up, apparently for good. Anthracite program now quite definite. Retail regulations issued. Wide opening for much confusion. Plans not flexible enough to meet situations that will arise.

Bituminous—New England factors have applied for licenses and have been assured that unless they hear otherwise from Washington they may continue in business as if licenses had already been issued. Representative houses are besieged by manufacturers and other buyers wishing to contract, but they are powerless to act. Firms that have certain contracts for a score of years have been obliged to notify customers that the latter must look elsewhere. In many cases a Philadelphia house or one nearer the mines has a sales contract for the output of a mine for a number of years, and where in other seasons the selling compensation has been shared with New England agencies the prospect is such that each concern in position to do so wants to collect the whole 15c. The New England connection is therefore left in the cold. While the "jobber" has been allowed to stay in business his livelihood, so far as bituminous is concerned all-rail, seems likely to be taken from him. Even the distributor of Pocahontas and New River finds himself in a dilemma with regard to selling commission. And this is only one of the anomalies created by present regulations.

Bituminous all-rail is coming through in fairly good volume, as compared with two months ago. Barely enough is received to keep plants running even on a hand-to-mouth basis. There are considerable areas in New England heretofore relying exclusively upon all-rail shipments where only the emergency supply drawn from tidewater allows the industries to run. The price on water shipments via Hampton Roads is now about \$9.50 per gross ton f.o.b. Boston or Providence. In some cases rehandlers are asking as high as \$11.20, but this latter is the exception. When this basis is compared with \$3.05 per net ton f.o.b. mines for all-rail shipment plus \$3 or so freight, the inequality is striking. Neighboring factories may face that inequality, but apparently there is no remedy. One month a consumer may get his coal all-rail, the next from tidewater. And there is no way of being sure of either!

The shortage of high volatile grades, particularly for illuminating and for by-product use, is causing real alarm. Blast furnaces are using an enormously increased tonnage and attention is being called to quantities of low sulphur coal used for fast train service. One New England railroad alone uses 150,000 tons and at a time when gas utilities are not able to get more than a percentage from their usual sources. The fact that anthracite also is going to be hard to get has a bearing on the probable scarcity of gas coal. Lime burners are also in straits for these grades, and unless long flame coal is forthcoming it will go hard with a lot of industries that are dependent upon them. It will be increasingly difficult this year to distinguish between "essential" industries.

Boats are still extremely scarce and are likely to continue so. The allotment of ships to the various interests will have to be most carefully administered, and at best

there will be much dissatisfaction. It is beginning to be realized that the same authority that has the distribution of coal should also have the disposition of steamers and barges. The Shipping Board authorized rate to Boston is still \$3.25 from Hampton Roads, the demurrage rate varying according to tonnage. Dispatch at the Virginia terminals has been good through March and the flow of coal certainly has been sufficient for the boats arriving. There is talk of equipping one of the old Norfolk piers for bunkering purposes exclusively. That should help, together with the thawing facilities that are being installed against next winter.

Anthracite—At this writing "spring prices" have not yet been given out, although there is little interest here in a possible reduction. Freight increases will absorb some, both rail and water, and the great anxiety of buyers will continue to be "to get coal." Receipts increase not at all, arrivals being contingent so largely on the tugs available. One day last week there were 20 barges loaded and loading in the Delaware, and only two tugs due. Unless some power is furnished New England is sure to be bitterly disappointed in any distribution that is now aimed on the 1916 basis.

NEW YORK

Demand for anthracite domestic sizes continues to be heavy, and dealers accept orders subject to new prices. The smaller coals easier, with prices slightly reduced. Production is heavy but insufficient to create a surplus. Bituminous conditions not satisfactory. Railroads favor certain mines, while others have to get along with curtailed car requirements.

Anthracite—The demand continues unprecedented for this time of the year. Stocks are down to rock bottom notwithstanding the efforts of the producers to create a surplus and even with the heavy production reported from the mining fields retail dealers have comparatively little coal in their yards.

Production is steadily improving and now that the Federal authorities and labor representatives have come to an agreement regarding strikes during the continuation of the war it is not expected there will be many interruptions of work in the mining fields. Records are being reported at some of the mines, while reports show that shipments are steadily increasing. Not many complaints are being received regarding unclean coal.

The number of cars handled daily at the loading piers shows a big improvement, which under ordinary conditions would be sufficient to create a surplus, but which now indicate that the demand is more than keeping pace with the supply.

There is an active demand for buckwheat, with a good supply of rice, barley and screenings on hand. Offers of part cargoes of the domestic coals with an equal amount or the smaller sizes are said to have been refused by some dealers who said they had not place to store the steam coals. Some dealers are willing to take anything in order to obtain domestic coals. No contracts are being made for the smaller coals for next winter.

Although no further official notice had been received from Washington regarding the discount of 30c. per ton in the mine prices for the domestic sizes of anthracite coal, Reeve Schley, New York County fuel administrator, announced on Tuesday a 35c. reduction in the retail prices. This includes the 30c. reduction from the mine prices and a 25c. cut from \$2.50 to \$2.25 per ton in the gross margin of profit allowed the retail dealer. This total reduction of 55c. is cut to 35c. because of the increase in freight rates of 15c. per ton and 5c. for handling expenses due to the recent strike among bargemen. On the small anthracite sizes the gross margin has been reduced from \$1.90 to \$1.75 per ton, but for pea coal and bituminous the gross margin fixed several months ago of \$2.10 per ton has been allowed to remain. These discounts are to remain in effect until Sept. 1 when the full winter price becomes effective again. It is understood that most of the companies are taking orders for coal with the understanding that the reduced prices will prevail.

Current quotations, per gross tons, f.o.b. Tidewater, at the lower ports are as follows:

	Circular	Individual
Broken	\$6.15	\$6.90
Egg	6.05	6.80
Stove	6.30	7.05
Chestnut	6.40	7.15
Pea	4.90	5.65
Buckwheat	4.45@5.15	5.10@5.85
Rice	3.90@4.10	4.10@4.85
Barley	3.40@3.65	3.10@4.10
Boiler	3.65@3.90	

Quotations for domestic coals at the upper ports are generally 5c. higher on account of the difference in freight rates.

Note—Foregoing prices are based on summer discount of 30c. per ton for the domestic sizes and the increase in freight rates of 15c. per ton on all anthracite coal.

Bituminous—Conditions are anything but satisfactory to most operators. There is a feeling among many of them that they are being discriminated against by the railroads, in that while their coals are not being taken for railroad consumption other operators are enabled to work their mines with a 100 per cent. car service. When coal was short last winter these same railroads were only too glad to get part of their supply from these same mines which are now idle a great part of the time because of the lack of cars.

In some instances offers by certain operators to continue furnishing coal to the railroads under the same arrangements as had existed have been turned down.

The order granting operators 20c. in addition to the Government prices for clean coal was welcome news to some local operators.

The license system is looked upon more favorably than it was at first. All jobbers have filed their applications at Washington for licenses to continue business and pending their issuance are being permitted to sell coal.

No improvement in conditions is reported from the mines. Production figures indicate a slight betterment but is due to heavier output at some mines, while other openings of a smaller nature have been unable to work more than half time. Car supply along the Pennsylvania continues bad, but along the New York Central is much better. Not much improvement is looked for under the present system of distribution.

Bituminous is in good demand for mixing with the small anthracite coals, and its scarcity accounts for the easier conditions for these sizes.

BITUMINOUS PRICES

	F.o.b. New York Gross	Mine Price Net	Gross
Central Pennsylvania...	\$5.06	\$3.05	\$3.41
Maryland:			
Mine-run.....	4.84	2.85	3.19
Prepared.....	5.06	3.05	3.41
Screenings.....	4.50	2.55	2.85

An advance of \$1.35 per net ton over operators' prices is authorized on coal for export and on bunker coal supplied to steamers engaged in foreign trade.

PHILADELPHIA

New distribution plan will soon be effective. Zoning also likely. Retailers busy filling storing orders. Jobbers temporarily licensed. Large companies now selling culm. Bituminous contracts create interest. Many expired agreements not renewed. Zoning plan also affects contracts. Coal continues short, car supply being the principal factor. Premium on clean coal.

Anthracite—The distribution plan on the basis of the coal year Apr. 1, 1916, to Mar. 31, 1917, has been about worked out, and many shippers have notified their customers that they intend to ship on this basis from now on. This has caused many strange alliances. For instance, it is known that since Mar. 31, 1917, the individual shippers have deserted much of their small trade, those dealers to whom they shipped just a car or two, and in their place have been nursing some of the larger trade in the hope of serving them permanently when normal conditions once more prevailed. Under the present plan the independents must now go back to their old customers.

Another complication caused by the absence of the new Government prices is that due to the expiration of practically all steam-coal contracts these consumers are now without protection. For the past several weeks the buyers of steam coals have been on the anxious seat and have kept the shippers constantly stirred up to find out just where they stand. It is known that almost all the producing companies are willing to renew contracts on practically the same basis as last year, and with this idea in view they made up all contracts a month ago and sent them to Washington for approval. Now it is learned that the Fuel Administration has rejected these agreements on account of wage clauses and other restrictions which it has always been the custom to place in them.

The business with the retailers for filling in orders after Apr. 1 has been quite heavy. However there are some dealers, in fact the majority, who are not making any particular effort to load themselves up with orders of this kind until they have some as-

surance of receiving the needed coal. Other dealers are taking the stand that they will go after all the business possible and then if they do not have the coal will present their orders to the fuel authorities with the hope that they will see that they are provided with the fuel to cover the orders in hand. The dealers are rigidly enforcing the filling out of the coal cards as required. In doing this there is an immense amount of work involved, but the dealers are complying, with little complaint. Receipts locally are comparatively light, as many of the larger shippers continue to ship heavily into other markets. Nevertheless a change in this respect is expected as soon as the companies begin working on the new distribution schedule.

A matter that has lately caused a good deal of comment among shippers, not to mention annoyance to them, is the new rule of the railroads not to make transfers of shipments either en route or after the cars reach destination. This action falls with particular severity on the concerns who are shipping culm, as often concerns who have ordered a trial car of this material reject it after it arrives at destination, as much of it falls far below the purchaser's ideas of what it should be. In order to protect themselves it is likely the shippers will require from purchasers a signed order before shipment is made, which makes the transaction a contract and binding upon the purchaser to receive it.

The Washington authorities state that the mass of work incident to issuing the licenses to jobbers has been so heavy that it will be impossible to act on the applications for several weeks. In the meantime jobbers who have made application will be allowed to continue business as usual. There seems to be no doubt that practically all jobbers will be permitted to continue and that the issuing of the license will be merely a formality.

An interesting development of the week has been the entrance of the larger companies into the field created by the demand for culm. Heretofore the independent shippers had this trade practically to themselves, the larger operators taking the stand that it did not pay to take the cars from other sizes. The price usually asked by the companies for culm is \$1, while the individuals get from \$1.25 to \$2 for theirs.

The prices per gross ton f.o.b. cars at mines for line shipment and f.o.b. Port Richmond for tide are as follows:

	Line	Tide		Line	Tide
Broken.....	\$5.90	\$6.05	Buckwheat...	\$3.15	\$3.75
Egg.....	4.80	6.00	Rice.....	2.65	3.65
Stove.....	5.05	6.35	Boiler.....	2.45	3.55
Nut.....	5.15	6.40	Barley.....	2.15	2.40
Pea.....	3.75	4.65			

Bituminous—The contract situation is much to the fore at this time. With the first of the month there was a heavy expiration of agreements of this kind, and while the consumers have been anxious to renew them there seems to be much hesitancy on the part of the fuel authorities to allow renewals. Of course, with a fixed price in effect there is nothing to be gained in this way, except that the consumer on his part feels that he has a certain protection as to being supplied.

Supplies continue to be short in this territory, and the lack of improvement in the car supply is a cause of great disappointment. As has been the case for some weeks now, the greatest difficulty is on Pennsylvania shipments west of Altoona, as the movement eastward of that point is reported quite good. With the limited number of cars at their disposal the miners are making the greatest use of them by loading to the fullest possible capacity, and the cars are reaching here "topped" two feet or more.

The operators were informed this week that the Federal Fuel Administration had made a ruling that where coal was prepared by the use of special mechanical appliances they would be allowed to add 20c. to the fixed Government price.

This week State Administrator Potter suggested to the national authorities the minimizing of priority orders, if not their entire elimination; the creation of a pool from which to draw coal for emergency use, and the organization of a Federal inspection system in the bituminous region.

BALTIMORE

Everybody busy signing up new contract relations and at the same time wondering how they are to be filled. Bituminous supply easier. New schedule for anthracite out.

Bituminous—The industrial world has descended on the coal men here in an effort to create new relationships under Government regulations and at the same

time assure themselves of coal supply over the coming year. Many changes of form are taking place and the trade is still a little uncertain where it stands. A number of mines are probably hooking up direct with some larger consumers, but the uncertainties existing under Government commandeering and preferential shipment orders is such that much of the business is still at sea.

Jobbers too are uneasy. Many find numerous contracts with business concerns as purchasing agents easy to get, but are wondering how they are to assure themselves of the coal to supply the firms in question. Few of the mines are willing to promise the jobbers a sure supply. Even some jobbers selected to act as purchasing agents for public utilities are in the same boat. It may be that the state fuel administrator will be forced to secure the coal for a large part of the supply through jobbers, should many mines continue in their present frame of mind of refusing to make contractual relations. The immediate supply of soft coal here is a little easier, following clearing of much railroad congestion.

Anthracite—The new spring price list was announced here this week, after conferences between the city coal committee of the Maryland fuel administrator's office and a committee representing the retail coal association. The prices are 35c. off the winter schedule here, and are as follows:

Broken white ash.....	\$10.10
Egg.....	10.00
Stove.....	10.25
Nut.....	10.35
Pea.....	8.95
Egg, Sunbury.....	10.25
Stove.....	10.50
Egg, Lykens Valley.....	10.70
Stove.....	11.10

The prices are for chute delivery, extra to be added for cost of bagging, carrying, etc. Twenty-five cents is allowed off the above schedule for cash. Under the plan consumers must fill out application cards and will be allowed two-thirds of their estimated requirements up to Mar. 31, 1919.

Lake Markets

PITTSBURGH

Coal output no better than stationary. Greater use of rivers contemplated. Premiums and penalties as to preparation of coal.

Coal output has not improved appreciably in the past week, if indeed it has not decreased slightly, as car supplies have been anything but satisfactory, eight weeks after winter weather practically disappeared. The transportation situation is not to be dismissed lightly in expectation that normal weather is to restore full movement. The situation is to be met by energetic action on the part of those in western Pennsylvania who can use the rivers. Several tipples are being built in the 14th and 15th pools of the Monongahela, which have hitherto shipped little river coal to Pittsburgh, the 15th pool being 130 miles above Pittsburgh, and there will be large shipments to Pittsburgh at least if not to Cincinnati. As is well known, the mines in the lower pools that used to furnish such a large Monongahela River coal traffic are largely worked out. Something is being done also in the direction of increased use of the Allegheny River.

There is still considerable contracting for coal being done for the twelvemonth beginning Apr. 1, but the major part of the business, or at least a very large part, had been done before the recent reaffirmation of prices, subject to Government price ruling at time of delivery. The Fuel Administration is urging that all essential wants be fully covered by contract, and that shipments be taken as fast as possible, even to the extent of buyers borrowing money to carry the coal.

There is a moderate amount of free coal in the market, but not equal to the demand in all cases. Demand from large consumers is relatively light, shipments as a rule being equal to requirements. All the intricacies of the zoning system have not been ironed out yet, as applied to Pittsburgh coal, which is under less restriction than the coal in most zones. The market remains quotable at \$2.20 for slack, \$2.45 for mine-run and \$2.70 for screened, per net ton, f.o.b. mine, Pittsburgh district. Jobbers can charge customers a brokerage in addition, up to 15c., when regularly authorized. There is a new regulation per-

mitting operators when licensed to do so to charge 20c. extra for coal especially prepared to eliminate foreign matter, but the regulations and standards are altogether in doubt. Considerable confusion is expected to result, at least for a time, from this new proviso, when already there is a penalty of 50c. on coal that does not pass the inspectors.

D. W. Kuhn, local fuel administrator, has fixed \$5.50 per net ton for domestic coal, delivered within a reasonable distance from yards on a level haul, price at yard being \$4.50. Later prices will be fixed for the hilly districts. All prices are to run to Sept. 1, when there will be an advance of 25c.

TORONTO

Coal supply still inadequate for heavy demand. Local deliveries much delayed. Consumption restricted by government order. Wood will be largely used for fuel.

Coal is being received in considerable quantities, but the supply is still insufficient to enable dealers to fill orders in arrears and meet current demands, which continue heavy. There is consequently much delay in local deliveries. A government order in council restricts consumers to 70 per cent of their normal requirements, except in cases where these do not exceed six tons per year. Dealers consider that it will be a matter of some difficulty to enforce this order. The civic authorities are considering an increase of the police force to keep up with the inspection work involved by the fuel regulations. The demand for fuel will largely be met by an increased consumption of wood, as many municipalities are preparing to take advantage of the offer of the Provincial Government to allow the cutting of cordwood in Algonquin Park.

Quotations for best grades per short ton are as follows: Retail anthracite, egg, stove, nut and grate \$10; pea, \$9; bituminous steam, \$9; slack, \$8 to \$8.50; domestic lump, \$10; cannel, \$11; wholesale f.o.b. cars at destination, three-quarter lump, \$7 to \$7.50, slack \$6.50 to \$7.

BUFFALO

Jobbers still wondering how they are coming out. Coal is freer, except that anthracite is not sized well. No lake coal. Car shortage the chief difficulty.

Bituminous—If the car supply was what it ought to be the difficulties in the coal trade would mostly disappear. A few days ago the cars became somewhat more plentiful, and at once coal began to accumulate, with reports that certain mines which were not favorably situated were shutting down. Then there would come counter reports of mines in certain districts that could get scarcely any cars and were losing their miners to go into other business or other mines that did get cars.

Anthracite—The situation turns on sizes and the April market. As is the case at this time of the year there is an excess of chestnut, for the big stockers of coal are asking for larger sizes, as they cannot use chestnut in their furnaces. The city distributors are taking the reports of consumers, who are to be given a percentage of what they used last year. Much difficulty is experienced by those who are expecting to move or make other changes in their needs of coal.

The city shipping agents have a sort of semi-official price to work from, though it did not come in till April and seems to be subject to unexpected changes, as is the case with bituminous. The consumer will get coal at only 15c. reduction, as the decline of 30c. is halved by a 15c. advance in freight. After the price seemed to be a certainty an order arrived that all coal mined in March must be sold at March prices.

The prospect of shipments by lake are not good and they will not be till there is a surplus of coal. Shippers do not seem to be making any preparation for loading vessels, though in former seasons they sometimes had hundreds of thousands of tons loaded before the lakes opened. Buffalo harbor has long been open this season and there is scarcely any ice in the lake at this point, though it will probably be some weeks before the upper lakes are open.

DETROIT

Bituminous coal is coming to the local market in fair volume. Anthracite is scarce. Lake shippers prepare for start.

Bituminous—Shipments of bituminous coal are being maintained in sufficient quantity to offset in fair degree the current requirements of consumers. The supply arriving is not so great, however, that

any accumulation occurs on tracks, and not much progress appears to have been made by many of the steam coal users in obtaining a reserve for future needs. Demand from steam plants is maintained in substantial volume, while there is a moderate amount of buying also by household consumers, who find it necessary to continue operation of heating plants and are unable to obtain hard coal or coke.

Comment is made by some of the jobbers that slack is less plentiful than would be desirable to meet needs of their customers. Incoming shipments also include little of the prepared sizes such as 3 lump, 4-in. lump and egg, this being due, the jobbers say, to a disposition on the part of the operators to do away with what is regarded as unnecessary work in the preparation of stock. The opinion is expressed by some of the jobbers that the reduction in number of sizes is a movement in the right direction. In the retail trade interest is at present centered on the attitude of the Michigan fuel administrator in insisting that a margin of not to exceed \$2.25 a ton is adequate for dealers handling domestic stock, after Apr. 1. Among some of the retailers there is an inclination to fall back on the earlier ruling by the Federal Administration permitting a margin of not to exceed 30 per cent. over the average of the gross margin in 1915. This, it has been calculated, would permit the retailers a margin of \$3.21 this year.

Anthracite—With only a small amount of anthracite coming into Detroit, the retailers are in most instances unable to fill orders for stove or egg sizes. Household consumers who desire to put in stocks for next winter's needs are unable to do so. Uncertainty as to whether Detroit is to receive anthracite in anything like normal quantity this season is a feature of the situation, disturbing both consumers and dealers. Attempts to get definite information have elicited only more or less conflicting reports.

Lake Trade—Preparations for reopening the movement of coal up the lakes are well under way. Some railroads are already offering to move coal to loading docks. The movement is expected to start in large volume.

COLUMBUS

A slight weakness in both domestic and steam grades has developed in Ohio during the past week. This is the usual lull before the lake season opens and is expected to pass away as soon as lake tonnage is required.

The usual between seasons lull has taken possession of the coal trade in Ohio territory. Both domestic and steam grades are showing slight softness, but not sufficient to cause any uneasiness in any quarter. The market is taking about all the tonnage now produced and storage is the order of the day. With the opening of the lake season in several weeks this condition is expected to pass away rapidly.

Steam business is now the best feature of the trade, according to both producers and distributors. Many steam plants are stocking up a large tonnage in order to be on the safe side in case of emergency. This is especially true of public service and large steam plants. General manufacturing concerns are also stocking up to a certain extent. Many steam users ordered coal from various sources during the time of stress and in larger quantities than was then needed. This coal is now coming in and only a few cancellations have been reported. Railroads are still taking a large tonnage for the movement of freight. Some contracting for steam tonnage is reported, but many sellers as well as buyers are waiting until the expected price readjustment is finished.

The domestic trade is also rather active, although some lull is reported in certain quarters. Dealers are stocking up to a certain extent, but there is a disposition on the part of some retailers to wait and see if it is possible to get Pocahontas and West Virginia splints. As a result stocking is not as active as might be expected under different circumstances. Hocking and Pomeroy lump is now the principal coals in the local market. The zoning plan is not expected to affect the local situation to any extent.

Prices of short tons f.o.b. mines are as follows:

	Hocking	Pomeroy	Eastern Ohio
Sized grades	\$2.70	\$3.05	\$2.70
Mine-run	2.45	2.80	2.45
Screenings	2.20	2.45	2.20

CINCINNATI

Both contract and spot demand heavy. Operators chiefly concerned with maintaining production. Traffic congestion furnishes the principal difficulty.

The beginning of the contracting season finds operators and their agents with the situation entirely in their hands, as it requires no effort this year to induce large consumers to make contracts for their fuel requirements. The difficulty is going to be in keeping up with contracts, as it was last fall and winter, as it seems certain that the transportation situation is going to continue to be the chief problem of coal operators as well as of manufacturers and other business men. Reports indicate some improvement in the matter of car supply, but the movement of freight is extremely slow and unsatisfactory, on account of the great and constantly increasing volume of traffic which has to be cared for. There are plenty of indications that large coal consumers, here and elsewhere, taking the lesson of last winter to heart, are going to do everything possible to provide storage facilities at their plants and put in some coal during the spring and summer as this seems to be the only expedient which will go far toward preventing another winter shortage. Domestic consumers are being urged to secure their next winter's fuel early, and dealers report that orders are being placed in unprecedented volume accordingly. Prices are on the Government scale, including those of dealers, which are based on a two-dollar margin.

LOUISVILLE

Good demand for steam and domestic coal, with supplies light and little stocking underway at present due to inability to obtain cars at mines. Production at present time light in all Kentucky mining districts.

Kentucky mine operators are rather discouraged with present conditions and the outlook. The trade had been given to understand and had fully expected a good supply of cars at this season, but the car supply is about as bad as if not worse than at any previous time in months. In the eastern Kentucky districts supplied by the Louisville & Nashville R. R., only about a 48 per cent. supply is being furnished. The situation is probably still worse in the western Kentucky district, where the Illinois Central has been furnishing practically no cars, some mines having gone six and seven days without a car; while on the western Kentucky Louisville & Nashville lines only about a 40 per cent. supply is being furnished.

There is an active demand for both steam and domestic coal, with domestic consumers anxious to place orders for season needs, most orders being for 15- to 25-ton lots. At the present time there appears to be no certainty that summer prices will be made effective, as the Kentucky board is going ahead on the supposition that present prices will stand. Any change will probably come direct from Washington. The domestic demand has been so good, with supplies so light, that no large stocks are accumulating, and local yards have a barren appearance, such as is shown in December.

BIRMINGHAM

Steam market active and spot demand good. No contracting being reported. Domestic inquiry improves as April is ushered in. Surplus coal hard to find. Production on about same basis as last period.

As yet no changes either in prices or classification affecting the coal industry in Alabama have been announced by the fuel administration, and it is hardly probable that there will be any revision of the mine schedules at this time except such as is necessitated by altered classifications, which are understood to have been agreed upon.

In the meantime there is an active demand for every ton of steam coal that can be produced in the district and any surplus product is hard to locate—in fact anticipated production over contract bookings at the mines is sold in advance, as has been the case for many months.

Domestic inquiry has stiffened some during the past week and a strong buying movement is expected to develop during the first part of April, as soon as it is definitely known whether or not there will be any price revisions.

The zone restrictions for this producing district contain practically the identical territory supplied normally, some little domestic coal having been shipped into the Carolinas in past years when dull trade conditions demanded expansion of territory, but this situation does not prevail at this time and domestic mines will have to maintain steady and heavy production to supply the officially allotted territory.

Brokers and other coal men affected by the new regulations are preparing to adjust themselves promptly to the new rulings effective Apr. 1, and under the present economic

conditions in the coal industry the broker will merely become a purchasing agent for the consumer, which, in fact, has been his position for quite a while, instead of a selling agent of the mines.

Coke

CONNELLVILLE

Car supplies poorer again, especially Pennsylvania cars. Market offerings light and confined chiefly to foundry.

Conditions as to car supply, after having been relatively good for three weeks, have grown particularly bad again. Last week's car supplies averaged only between 35 and 40 per cent and supplies this week have been relatively poor thus far. It is estimated roughly that last week's coke shipments were not over approximately 250,000 tons, against about 334,000 tons shipped in each of the three preceding weeks. The main difficulty is as usual with the Pennsylvania system, whose car supplies have been especially light, and on some days its contribution to the Monongahela R.R. have been almost negligible, the Pittsburgh & Lake Erie furnishing nearly all the cars that road secured. The Pennsylvania is now restricting certain types of cars from going off its tracks, especially affecting consumers reached by the Philadelphia & Reading.

Furnace coke is only occasionally offered in the open market. Operations have been so irregular that operators if they have any coke to offer can usually offer it as 72-hour, and therefore at the \$7 price, so that the limited tonnages available in the market are almost altogether classed as foundry, and this coke must be sold to foundries, which as a rule is not difficult. Even with the "restricted" Pittsburgh & Lake Erie cars a buyer can usually be found. The market remains quotable at \$6 for furnace, \$7 for foundry and \$7.30 for crushed, over 1-in. Sellers of coke screenings, obtained from old dumps, have raised their price from \$5.50 to \$6, having found a good sale for this new-found material.

The "Courier" reports production in the week ended Mar. 23 at 339,580 tons, an increase of 4458 tons, and shipments at 333,537 tons, a decrease of 416 tons.

Buffalo—The situation does not change materially. A moderate and constant supply comes in and the furnaces are able to get along with it. The ore supply at the furnaces is large, so that only a few small ore charters have been made, all at \$1.50 per ton from Lake Superior. Furnaces have been handicapped somewhat by shortage of men and cars, but have as a rule done well. A charter meeting is to be held this week, when rates will no doubt be fixed. A good lake season in ore is looked for.

Birmingham—Coke producers report strong inquiry for this product in the local market, but there has been no improvement in the supply of either furnace or foundry coke, and only a limited tonnage is available to the spot trade. There has been some betterment in the car supply recently and producers have been able to make some progress in catching up on delayed deliveries. The Sheffield Iron Corporation will, in the course of a week or so, have 300 beehive ovens near Jasper in shape for operation. These ovens have been idle for many years and the output from them will be used in the furnaces of this corporation at Sheffield, which will be started up in the near future.

Middle Western

GENERAL REVIEW

The desire to clean up out-of-zone orders prior to Apr. 1 made the market active during the past week.

Producers with their own sales organizations and jobbers alike have had an unusual active week, confining their main efforts to clearing their books of orders that were outside the zone limit, which became effective Apr. 1.

When the zone plan was announced by the Fuel Administration almost every sales company had at least a few orders for domestic coal booked for movement to distant points, and beyond the zoning line. This was true on the higher grade and better prepared coals of southern Illinois and Indiana. Dealers in Lincoln and Omaha, Neb., and Council Bluffs, Iowa, who have for years handled southern Illinois coal, have taken advantage of the situation and urged the filling of orders.

They also placed additional orders where they thought it possible to get them filled, the result being the neglect of tonnage movement for several days to within new zone districts to the advantage of out-zoning points.

This movement no doubt would have been far greater had there been a better supply of equipment. This movement has also reflected its benefits on the producers of inferior grades of coal, because of needs close to Illinois, Indiana and Missouri points.

The question of equipment has been quite a factor in helping to steady the market. Indiana has had only a 50 per cent car supply for the past week, Illinois about 65 per cent and in a number of instances embargoes have so reflected on the shippers that it had the effect of causing operators to find a new market for their coal. The taking away from Illinois and Indiana operators of markets that had been established for years, because of rail connections, has caused considerable confusion, which will take some time to overcome. This applied in particular to the Danville field, which depends to a great extent on the Wabash and Big Four railroads for its car supply. Danville is near the state line and had for years shipped a considerable tonnage into Indiana, east of the east zone for Illinois coal. Some of the operators from this field have asked Dr. Garfield to allow them to continue temporarily their movement into Indiana until they might establish connections elsewhere in the zone in which their coal is permitted to move.

CHICAGO

Market firm on better grades, buying heavy.

The Chicago market continues to be firm on high grades of Illinois and Indiana coal, and the trade is quickly taking up all free offerings. Williamson, Franklin and Saline County operators are not finding it difficult to get all the orders they need. During the week past several important factors entered the game, including some of the large railroad companies in the North and Northwest. Every possible pressure is being brought to bear on the consumer to show him that it is necessary to buy coal now if a coal famine is to be avoided next winter.

Quite a few contracts were closed during the past week, all at the Government price and subject to the approval of the Federal Fuel Administrator. The form of contract generally used was the one adopted by the National Coal Association and approved by Dr. Garfield.

Quotations in the Chicago market are as follows, per net ton f.o.b. car at mines:

	Williamson and Franklin County	Saline and Harrisburg	Fulton and Peoria	Springfield	Cartersville	Grundy, La Salle, Bureau and Will
Steam lump.....	\$2.65@2.80	\$2.65@2.80	\$3.05@3.20	\$2.65@2.80	\$2.65@2.80	\$3.35@3.50
Domestic lump.....	2.65@2.80	2.65@2.80	3.05@3.20	2.65@2.80	2.65@2.80	3.35@3.50
Egg or furnace.....	2.65@2.80	2.65@2.80	3.05@3.20	2.65@2.80	2.65@2.80	3.35@3.50
Small egg or nut.....	2.65@2.80	2.65@2.80	3.05@3.20	2.65@2.80	2.65@2.80	3.35@3.50
Stove.....	2.65@2.80	2.65@2.80	3.05@3.20	2.65@2.80	2.65@2.80	3.35@3.50
Chestnut.....	2.65@2.80	2.65@2.80	3.05@3.20	2.65@2.80	2.65@2.80	3.35@3.50
Pea.....	2.65@2.80	2.65@2.80	3.05@3.20	2.65@2.80	2.65@2.80	3.35@3.50
Washed egg.....	2.65@2.80	2.65@2.80	3.05@3.20	2.65@2.80	2.65@2.80	3.35@3.50
Washed stove.....	2.65@2.80	2.65@2.80	3.05@3.20	2.65@2.80	2.65@2.80	3.35@3.50
Washed nut.....	2.65@2.80	2.65@2.80	3.05@3.20	2.65@2.80	2.65@2.80	3.35@3.50
Mine-run.....	2.15@2.30	2.15@2.30	2.85@3.00	2.45@2.60	2.45@2.60	3.10@3.25
Screenings.....	2.15@2.30	2.15@2.30	2.45@2.60	2.50@2.65	2.15@2.30	2.85@3.00
Washed slack.....	2.15@2.30	2.15@2.30	2.50@2.65	2.50@2.65	2.15@2.30	2.85@3.00

	Clinton and Sullivan	Knox and Greene	Eastern Kentucky	Smokeless W. Va.	Penna.	Hocking	West Va. Splint
Dom. lump.....	\$2.65@2.80	\$2.65@2.80	\$3.10@3.25	\$2.60@2.75	\$2.70@2.85	\$3.05@3.20	\$2.85@3.00
Steam lump.....	2.65@2.80	2.65@2.80	3.10@3.25	2.60@2.75	2.70@2.85	3.05@3.20	2.85@3.00
Egg.....	2.65@2.80	2.65@2.80	3.10@3.25	2.60@2.75	2.70@2.85	3.05@3.20	2.85@3.00
Small egg or nut.....	2.65@2.80	2.65@2.80	3.10@3.25	2.60@2.75	2.70@2.85	3.05@3.20	2.85@3.00
Mine-run.....	2.40@2.55	2.40@2.55	2.85@3.00	2.45@2.60	2.45@2.60	2.70@2.85	2.60@2.75
Screenings.....	2.15@2.30	2.15@2.30	2.60@2.75	2.10@2.25	2.10@2.25	2.55@2.70	2.35@2.50

MILWAUKEE

Coal men scraping the bins and yards in order to make the fuel supply last until first lake cargoes arrive. Fine weather helps the situation.

A survey of the coal district in Milwaukee harbor reveals the fact that the big coal handlers are "scraping the dish," so to speak and that Milwaukee's fuel supply is almost exhausted. Fortunately the weather continues so warm that the consumption for heating purposes has been reduced to a minimum, while rail supplies keep the busy industries moving. Prices are the same as they were in February and will no doubt be held steady until the Federal Fuel Administrator orders a change.

It is believed that after the homeowners in the cities have been supplied with their quotas of fuel it will not be a difficult matter to estimate the needs of the float-

ing population in small flats and rented dwellings. In the rural districts the task of estimating transient needs will be an easier problem. It is becoming more apparent every day that there will be a great hegebra to the wood piles the coming winter and that coal will be abandoned in the average country home from now on and until the coal situation betters.

The fuel administrator will review the mass of applications carefully, and in case it is thought more coal is asked for than is really needed an explanation will be requested.

ST. LOUIS

An unusually quiet market, with plenty of coal. Car shortage acute on Mobile & Ohio. Prevailing also on other lines. Steam demand easy, with no domestic business. A good tonnage of anthracite moving in and some Arkansas.

The local condition is extremely easy. There is practically no steam call at all, and all steam sizes are heavy. This does not apply on the coal from any one particular field, but is prevalent on all steam sizes from all fields. Coals that were difficult to get and have been in demand for many months, such as Nos. 1, 2, 3, 4 and 5, are a drag on the market. This is caused largely on account of the embargoes against Chicago on shipments via the Chicago & Alton and Wabash.

The domestic demand is light, both in the city and country, caused by an expectation on the part of the public that prices would go down on Apr. 1. Shortly after the first of April new prices are to be set in St. Louis for the domestic trade, and this will stimulate business. Everything looks extremely good for an unusual domestic tonnage.

The past week in the Cartersville field has been unusually quiet. There has been a shortage of cars and in some places a shortage of water for washers and boilers. At a few mines there has been a little unbilled coal caused by being loaded in foreign equipment.

The Mt. Olive field has been a trifle heavy the past week in some sections. A few mines have had coal left over, but this was practically nothing in comparison with the tonnage produced. In a general way this tonnage has moved north and west up to the first of April in extremely heavy volume on account of the zone restrictions which went into effect on Apr. 1, which prevented Illinois coal from going out on the Omaha, St. Joseph or Kansas City market. This coal was largely domestic size, and at no period in the history of this field has such a tonnage moved in such a short space of time to the western markets.

The prevailing prices are, per net ton f.o.b. mine:

	Williamson and Franklin County	Mt. Olive and Staunton	Standard
6-in. lump....	\$2.65@2.80	\$2.65@2.80	\$2.65@2.80
3x6-in. egg.....	2.65@2.80	2.65@2.80	2.65@2.80
2x3-in. nut.....	2.65@2.80	2.65@2.80	2.65@2.80
No. 2 nut.....	2.65@2.80	.....	.....
No. 3 nut.....	2.65@2.80	.....	.....
No. 4 nut.....	2.65@2.80	.....	.....
No. 5 nut.....	2.15@2.30	.....	.....
2-in. sergs....	2.15@2.30	2.15@2.30	2.15@2.30
2-in. lump.....	.....	.....	2.65@2.80
3-in. lump.....	.....	2.65@2.80	.....
Steam egg.....	2.65@2.80	2.65@2.80	2.65@2.80
Mine-run.....	2.45@2.60	2.45@2.60	2.45@2.60

Washed:

No. 1.....	\$2.65@2.80	\$2.65@2.80	.....
No. 2.....	2.65@2.80	2.65@2.80	.....
No. 3.....	2.65@2.80	2.65@2.80	.....
No. 4.....	2.65@2.80	2.65@2.80	.....
No. 5.....	2.15@2.30	2.15@2.30	.....

Williamson & Franklin Co. rate is 87c. Other fields 72c.

SEATTLE

Outlook poor for West this winter.

The assumption made by the Federal Fuel Administrator that the coal-producing fields of Washington, Montana, Wyoming, Utah, Colorado and New Mexico can supply the bituminous coal needs not only of these six states but also of California, Oregon, Idaho, Nevada and Arizona, and must do so after Apr. 1 when shipments into these states from other fields must stop, is not founded on fact. It means that the coal fields of Wyoming, Utah, Colorado and New Mexico will have to supply not only their needs but practically the entire needs of California, Idaho, Oregon, Nevada and Arizona, as well as over 1,000,000 tons to Montana and over 250,000 tons to Washington, for these two latter states are not now nor did they last year produce anywhere near what they consumed.

Washington last year produced 4,002,749 tons of coal while Montana produced 4,406,155 tons, a total of 8,408,903 tons. Washington consumed 4,161,400 tons while Montana consumed 5,370,202 tons, a total for the two states of 9,531,602 tons, a difference of 1,122,699 tons consumption over production. Montana last year imported 1,158,612 tons of coal and exported 186,565 tons. Washington imported 539,263 tons and exported 380,610 tons. Under the new arrangements it would not be expected that Montana would export any coal, which would still leave her an excess consumption of 972,047 tons over production. Of Washington's imports 50,000 tons were from Montana and 12,000 tons from eastern states, which she could not expect this year. About 356,000 tons were imported from British Columbia and 121,897 from Utah and Wyoming.

If Washington did not export any coal this year she would have to import 150,000 tons of coal from Utah and Wyoming which, combined with her production, would just equal her consumption; and her 380,000 tons of exports to California, Oregon, Idaho and Montana would have to be borne by Utah and Wyoming. It is not expected that British Columbia will be able to export to either Washington or Montana the amount of coal it did last year, which will also increase the amount of coal Utah and Wyoming mines will be expected to furnish these two states. For this reason it is safe to say that Utah and Wyoming will have to supply a deficiency of more than 1,250,000 tons of coal to Washington and Montana this year, for whatever increased production may be made in the latter two states this year will be absorbed by increased consumption.

The figures upon which the report is based are from the offices of W. J. Swindlehurst, of Montana, and David Whitcomb, of Washington.

General Statistics

PRICES OF COAL TAR PRODUCTS (Crude)

Benzol, pure, water white, gal.....	30	35
Benzol, 90 per cent., gal.....	.....	.....
Xylol, pure, water white, gal.....	35	50
Solvent naphtha, water white, gal.....	17	22
Solvent naphtha, crude, heavy, gal.....	13	16
Creosote oil, 25 per cent., gal.....	33	35
Dip oil, 20 per cent., gal.....	29	30
Pitch, various grades, ton.....	8.00	20.00
Carbolic acid, crude, 95-97 per cent., lb.....	1.05	1.10
Carbolic acid, crude, 50 per cent., lb.....	.....	.....
Carbolic acid, crude, 25 per cent., lb.....	35	38
Cresol, U. S. P., lb.....	18	20

CURRENT PRICES—MATERIALS & SUPPLIES

IRON AND STEEL

FIG IRON—Below are the present quotations, with a comparison of a month and a year ago:

	Apr. 1, 1918	One Month Ago	One Year Ago
CINCINNATI			
No. 2 Southern foundry....	\$35.90	\$33.00	\$18.00
No. 2 Northern foundry....	35.90	35.95	21.76
NEW YORK			
No. 2X Northern foundry....	34.25	34.25	22.00
No. 2 plain Northern foundry	33.75	33.75	21.00
No. 2 Southern foundry....	37.25	37.25	22.00
BIRMINGHAM			
No. 2 Southern foundry....	33.00	33.00	16.00
CHICAGO			
No. 2 Northern foundry....	33.00	33.00	22.00
No. 2 Southern foundry....	37.00	37.00	....
PITTSBURGH			
Bessemer iron*	37.25	37.25	24.95
Basic iron*	33.95	33.95	20.95

*These prices include the freight charge from the valley to the Pittsburgh district. †Delivered Tidewater, New York.

STRUCTURAL MATERIAL—The following are the base prices, f.o.b. mill, Pittsburgh, together with the quotations per 100 lb. from warehouses at the places named:

	Mill, Pittsburgh	New York—Apr. 1, 1918	1 Year Ago	St. Louis	Chicago
Beams, 3 to 15 in.....	\$3.00	\$4.195	\$3.25	\$4.27	\$4.20
Channels, 3 to 15 in.....	3.00	4.195	3.25	4.27	4.20
Angles, 3 to 6 in., ¼ in. thick	3.00	4.195	3.25	4.27	4.20
Tees, 3 in. and larger.....	3.05	4.245	3.40	4.27	4.25
Plates	3.225	4.45	5.15	4.52	4.45

BAR IRON—Prices in cents per pound at cities named are as follows:

	Pittsburgh	St. Louis	Denver	Birmingham
Apr. 1, 1918.....	3.50	4.17	4.05	4.38

NAILS—Prices per keg from warehouse in cities named:

	Mill, Pittsburgh	St. Louis	Denver	Chicago	Birmingham	San Francisco	Dallas
Wire	\$2.70	\$4.30	\$4.85	\$4.25	\$4.25	\$4.60	\$4.50
Cut	2.70	5.25	....	4.40	....	6.15	....

TRACK SUPPLIES—The following prices are base per 100 lb. f.o.b. Pittsburgh for carload lots, together with the warehouse prices at the places named:

	—Pittsburgh—	Apr. 1, 1918	One Year Ago	Cincinnati	Chicago	St. Louis	San Francisco	Birmingham	Denver
Standard railroad spikes ½-in. and larger	\$3.90	\$2.65	\$6.00	\$5.00	\$5.00	\$6.25	\$5.30	\$5.00	....
Track bolts	4.90	3.25	8.90	6.25	6.00	7.45	6.75	6.00	....
Standard section angle bars	3.25	2.00	....	4.50	6.00	4.90	....	4.30	....

COLD DRAWN STEEL SHAFTING—From warehouse to consumers requiring fair-sized lots, the following discounts hold:

	Cincinnati	Cleveland	Chicago	St. Louis	Birmingham
17½% List	+10%	+10%	+10%	+10%	+20%

HORSE AND MULE SHOES—Warehouse prices per 100 lb. in cities named:

	Mill, Pittsburgh	Cincinnati	Chicago	St. Louis	Denver	Birmingham
Straight ..	\$5.25	\$6.50	\$6.50	\$6.25	\$7.50	\$6.25
Assorted ..	5.40	6.50	6.50-7.00	6.40	7.75	6.50

Cincinnati—Horseshoe nails sell for \$4.50 to \$5 per 25-lb. box.

CAST-IRON PIPE—The following are prices per net ton for carload lots:

	New York—Apr. 1, 1918	1-Month Ago	One Year Ago	Chicago	St. Louis	San Francisco	Dallas
4 in.	\$58.35	\$58.35	\$44.50	\$57.55	\$57.00	\$70.00	\$61.00
6 in. and over	55.35	55.35	41.50	54.55	54.00	67.00	58.00

Gas pipe and 16-ft. lengths are \$1 per ton extra.

STEEL RAILS—The following quotations are per ton f.o.b. Pittsburgh and Chicago for carload or larger lots. For less than carload lots 5c. per 100 lb. is charged extra:

	—Pittsburgh—	Apr. 1, 1918	One Year Ago	Chicago	St. Louis	San Francisco	Dallas
Standard bessemer rails...	\$65.00	\$38.00	\$65.00	\$57.00	\$70.00	\$61.00	....
Standard openhearth rails...	67.00	40.00	67.00	57.00	70.00	61.00	....
Light rails, 8 to 10 lb....	*3.135 (100 lb.)	58.00	*3.135 (100 lb.)	53.00	....	....	....
Light rails, 12 to 14 lb....	*3.09 (100 lb.)	57.00	*3.09 (100 lb.)	54.00	....	....	....
Light rails, 25 to 45 lb....	*3.00 (100 lb.)	53.00	*3.00 (100 lb.)	52.00	....	....	....

OLD MATERIAL—Prices per net ton in Chicago and St. Louis (including delivery to buyer's works and freight transfer charges):

	New York—Apr. 1, 1918	Chicago—Apr. 1, 1918	St. Louis—Apr. 1, 1918
No. 1 railroad wrought.....	\$32.75	\$35.00	\$35.00
Stove plate	22.00	23.50	20.00
No. 1 machinery cast.....	35.00	27.50	22.00
Machine shop turnings.....	16.50	17.50-19	20.00
Cast borings	17.80	17.50	19.00
Railroad malleable cast.....	31.75	29.00	25.50-26

COAL BIT STEEL—Warehouse price per pound is as follows:

	New York	Cincinnati	Birmingham	St. Louis	Denver
	\$0.12	\$0.16½	\$0.16	\$0.16	\$0.17

DRILL STEEL—Warehouse price per pound:

	New York	St. Louis	Birmingham
Solid	15c.	14c.	15c.
Hollow	24c.	25c.	....

PIPE—The following discounts are for carload lots f.o.b. Pittsburgh: basing card of Nov. 6, 1917, for steel pipe and for iron pipe:

	Steel	Iron
Inches	Black Galvanized	Black Galvanized
½, ¾ and 1.....	44% 17%	¾ to 1½..... 33% 17%
1½.....	48% 33½%	....
¾ to 3.....	51% 37½%	....

	2	2½ to 6.....	2	2½ to 6.....	2	2½ to 6.....
LAP WELD	44%	47%	31½%	34½%	26%	12%
BUTT WELD	42%	45%	30½%	33½%	27%	14%
EXTRA STRONG PLAIN ENDS	40%	43%	28½%	31½%	25%	11%
¼ to 1½.....	49%	49%	36½%	36½%	28%	15%

	2	2½ to 6.....	2	2½ to 6.....	2	2½ to 6.....
LAP WELD	42%	45%	30½%	33½%	27%	14%
BUTT WELD	40%	43%	28½%	31½%	25%	11%
EXTRA STRONG PLAIN ENDS	40%	43%	28½%	31½%	25%	11%
¼ to 1½.....	49%	49%	36½%	36½%	28%	15%

From warehouses at the following named the following discounts hold for steel pipe:

	New York	Chicago	St. Louis
¾ to 3 in. butt welded.....	38%	42.8%	40.1%
3½ to 6 in. lap welded.....	18%	38.8%	36.1%

	New York	Chicago	St. Louis
¾ to 3 in. butt welded.....	22%	27.8%	25.1%
3½ to 6 in. butt welded.....	List	24.8%	22.1%

Malleable fittings, Class B and C, from New York stock sell at list price. Cast iron, standard sizes, 15 and 5%.

SHOP SUPPLIES

NUTS—From warehouse at the places named, on fair-sized orders, the following amount is deducted from list:

	New York—Apr. 1, 1918	One Year Ago	Cleveland—Apr. 1, 1918	One Year Ago	Chicago—Apr. 1, 1918	One Year Ago
Hot pressed square....	\$1.00	\$0.50	\$1.40	\$2.60	\$1.05	\$3.00
Hot pressed hexagon....	1.00	.50	1.20	2.60	.85	3.00
Cold punched square....	1.00	.50	.75	3.00	1.00	2.50
Cold punched hexagon....	1.00	.50	.75	3.00	1.00	3.00

Semifinished nuts sell at the following discounts from list price:

	New York	Chicago	St. Louis
Apr. 1, 1918	40%	50%	50%
One Year Ago	50%	50%	50%

MACHINE BOLTS—Warehouse discounts in the following cities:

	New York	Chicago	St. Louis
¾ by 4 in. and smaller	30%	45%	40-2½
larger and longer up to 1 in. by 30 in.	15%	33%	30-5%

WASHERS—From warehouses at the places named the following amount is deducted from list price:

	New York	Chicago	St. Louis
For wrought-iron washers:	....	....	....
New York..\$1.00	Cleveland..\$2.00	Chicago..\$3.00	St. Louis..\$3.00
For cast-iron washers the base price per 100 lb. is as follows:	....	....	....
New York..\$5.00	Cleveland..\$4.50	Chicago..\$3.50	St. Louis..\$2.75

RIVETS—The following quotations are allowed for fair-sized orders from warehouse:

	New York	Cleveland	Chicago
Steel ¾ and smaller.....	30%	35%	40%*
Tinned	30%	35%	40%*

*For less than keg lots the discount is 35%.

Button heads, ¾, 1 in. diameter by 2 in. to 5 in., sell as follows per 100 lb.:

	New York	Cleveland	Chicago
New York	\$7.00	\$5.85	\$5.50
Coneheads, same sizes:	....	....	....
New York	\$7.10	\$4.50	\$5.60

MISCELLANEOUS

GREASES—Prices are as follows in the following cities in cents per pound for barrel lots:

	Cincinnati	Chicago	St. Louis	Birmingham	Denver	Pittsburgh
Cup	7	5½	6.1	7½	10	7½
Fiber or sponge....	8	6	6.4	7½	15	7½
Transmission....	7	6	6.4	7½	15	8½
Axle	4½	4	3.6	3	6	5½
Gear	4½	4½	6.5	7½	6	3½
Car journal	22 (gal)	3½	4.8	3	6	7½

